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ORIGINAL MEMOIRS.

REMINISCENCES OF THE EARLY DAYS OF THE AMERICAN SURGICAL ASSOCIATION.*

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THE title of my paper presents an opportunity of speaking, in a reminiscent way, of the beginning days of the Association, of placing on record some of the notable events which have occurred in the first quarter of a century of its existence, and of indulging in some reflections on the influence it has exerted upon surgical science in this country, and on its development and growth in the future. It is impossible to speak of the foundation and early days of the Association without paying deserved tribute to the great Surgeon, its Founder, Samuel D. Gross, who in such marked manner has impressed his character upon it.

In undertaking the task which is thus imposed, I am moved to express some hesitation, since, without formal consent, I have assumed to speak for those who, with me, constitute the survivors of the number, forty-four in all, who, in the year 1880, signed the Constitution, and became the original Fellows of the Association: P. S. Conner, W. W. Keen, and Solon Marks.

An intimate association with the Founder, and the enjoyment of official position in the Association for quite twenty-

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five years of its active work, may enable me to perform, in a manner acceptable to my co-survivors, the duty imposed.

Of my acquaintance and association with the Founder I may, I trust, with becoming propriety, speak first.

This acquaintance began when I brought to him, during the struggles of the Civil War, a letter of introduction from my father, a physician, who had been a college mate with him in Jefferson Medical College, and who had received his degree in medicine as a member of the first class which graduated from that institution, in the year 1827, after a full two years' course of instruction of three months each, reinforced by the fiction of a year's study and apprenticeship in the office of the preceptor; mayhap, in those early days the honored and beloved family physician in the city, or the autocratic Solon of the small community, the country practitioner, the deft wielder of the venesecting lancet; the unrelenting dispenser of drachm doses of the mild chloride of mercury and pint draughts of nauseous decoctions of barks and herbs; withal, the true friend, the wise counsellor, the bearer of cheer and sunshine into the cheerless room of the log cabin, the sagacious medical adviser, with knowledge founded upon years of carefully observed experience, the faithful physician, to whom the night was not given for rest, nor the day for recreation, whom storm did not stay, nor balmy breezes lure from duty.

At the same time with me, making likewise his acquaintance, there came a Fellow of our Association, whose name, through the achievement of his distinguished ancestor, enriched by his own endeavors, will live forever in the history of surgery—John Collins Warren.

The acquaintance with the Founder of our Association thus begun, ripened in the succeeding years into an enduring friendship, which ended only with his life, and controlled in marked manner my professional career. Honored by his confiding friendship, I learned to know him as a man, and as his assistant in his private and public surgical practice, I learned to know and appreciate him as the great surgeon, the eloquent and forceful expounder of the principles and practice of sur-

gery in the lecture hall, the erudite author of monographs and text-books on the science and the art of surgery, and the pioneer worker and author in pathological research in this country. He was not only the fearless surgeon, but, as well, the wise physician. With him, in many cases, the knife was the "dernier ressort," brought into action only after most careful study and discriminating judgment had made sure the need for its use, and his mind's eye had looked upon the hidden morbid condition, and had given to him a true picture of its nature. Diagnosis by exploratory operation was little, if, indeed, ever, cultivated by him, and Hogarth's artistic curves did not limit his operative procedures.

Of stalwart form, with a commanding presence and the front of Jove, he stood in the clinical arena the type of the great teacher. When inspired by the exposition of some important subject which was of paramount interest to him, and with which his mind and heart were filled, he rose to a majestic height, and the words of instruction which flowed from his lips, as the stream from the overflowing fountain, held his audience in close and charmed attention. His superiors, on such occasions, he had not—his equals, if such existed, were, indeed, few. "*Hier stehe ich, ich kann nicht anders.*" Words which, with him, as with the great Reformer who gave them birth, gave expression to the resolute convictions which inspired his opinions and guided his teachings. A tireless worker, his day from early morn was given to ceaseless work, and in his office library he burned to the dregs the midnight oil. "Nulla dies sine linea," was the legend of his life, and it guided him to the last days of his years. With becoming deference the writer feels he can place on record words spoken on the day before death came to him. "I have yet work to do. Why should I die?" Overwhelmingly absorbed as he was in work, he yet gave time to much needed relaxation in social amenities. The doors of his hospitable home were ever open to members of his profession from all parts of the country, and to distinguished men of learning from all parts of the world. He appreciated, to the fullest extent, the value of this social inter-

mingling of members of the profession, as a means of promoting interchange of thought and the study of individual character, and he desired to make it a prominent feature of the Association he founded.

Such is, in brief, a portraiture of our Founder. Filling the eminent position he did in our country, known as he was in the countries of the Old World, and crowned, as he had been, with the highest honors of their great institutions of learning, he, of all others, was best qualified to bring into existence an Association which would gather together, for the cultivation of surgery, the surgeons of the country, prominent as authors, teachers, and skilled practitioners. He designed it to be a school for mutual instruction and improvement, a court of supreme authority into which the great questions of Surgery should be brought for discussion and judgment, a gathering in social intercourse of the individual workers in surgical science. Medical politics was to be forever debarred, was to have no place in the deliberations of the organization. The great representative association of the medical profession of the country afforded a large field into which all questions affecting the "body politic," could be brought for adjudication—and were there to be left. Personal friendship was not to be the test of the qualifications of the candidate seeking admission into the Association, nor personal animositites or local factional contests the bars which would shut out the eligible candidate.

Our Founder, cherishing the desire he did with regard to the formation of the Association, called about him, at the time of the meeting of the American Medical Association, at Atlanta, Georgia, in the year 1879, a few of the prominent surgeons there assembled in attendance, and disclosed to them the object which was very close to his heart. Although this meeting has taken the place in the minutes of the Association as the first, in chronological order, it was simply a meeting for conference. Its purpose was to obtain an expression of the feeling which might exist as to the desirability of forming an organization such as he contemplated, and in order that formal discussion of the subject should take place, it was duly organ-

ized by the election of a chairman and secretary. The discussion which ensued developed the fact that the sentiment was markedly unfavorable, if not positively hostile. By some, the opinion was expressed that the movement had the character of an attack upon the American Medical Association, intended to destroy its influence as a representative body of the medical profession; it would originate, they contended, a condition which, if extended to other specialities of medicine, would result in its disintegration. It was claimed that all of the objects sought to be accomplished by such an Association could be accomplished through the Surgical Section of the American Medical Association.

Without taking any action whatever, the conference adjourned, and later, at a consultation held with friends of the project, it was decided to issue the following circular letter: "The undersigned respectfully solicit your coöperation in founding a National Surgical Society, to consist, exclusively, of distinguished surgical practitioners, writers, and teachers, and request you to attend a meeting to be held at the College of Physicians and Surgeons, New York City, on Monday, May 31, 1880, on the adjournment of the meeting of the American Medical Association. Signed by, W. W. Dawson, Moses Gunn, L. A. Dugas, W. T. Briggs, and S. D. Gross."

At the place, and on the date, given in the circular letter, surgeons who had been invited assembled, and a temporary organization was effected by the election of Dr. L. A. Sayre as Chairman. In some well-chosen remarks Dr. Gross presented the object of the meeting, and then moved that an Association, such as contemplated in the circular letter, be formed. This motion was unanimously approved, and he then offered a draft of a Constitution and By-laws, to constitute the organic law of the Association, which, on motion, was adopted, and those present forty-four in number, signed it, paid the initiation fee, and thus became the original members of the American Surgical Society, as it was designated in the draft of the Constitution and By-Laws proposed and submitted for adoption by the Founder. The formal and perfected organization

of the Association was then effected by the election of Dr. Samuel D. Gross as the first President and Dr. J. R. Weist as the first Secretary, with other officers to conduct the business affairs of the Association. It was deemed desirable to submit the Constitution and By-Laws to examination and to revision, if found necessary, and to this end a committee, consisting of Drs. John H. Packard, John Ashhurst, Jr., John H. Brinton, W. W. Keen, and J. Ewing Mears, was appointed, and instructed to report at the next meeting, which, on motion for adjournment, was ordered to be held in Richmond, Virginia, on May 5, 1881.

With these ceremonies, simple in character, the American Surgical Association was brought into existence, charged with most important responsibilities as to the development and growth of surgical science in our country. By its organic law it imposed upon its members and their successors most responsible duties for the maintenance of the high standard of qualification of those who should be admitted to its Fellowship, as therein provided.

A national character was given to the Association in the list of surgeons whose names were affixed to the Constitution at this time of its organization. Among them was James R. Wood and L. A. Sayre, New York; J. C. Hutchison, Brooklyn; E. M. Moore, Rochester; Moses Gunn, Chicago; John T. Hodgen, St. Louis; T. G. Richardson, New Orleans; Claudius H. Mastin, Mobile; L. A. Dugas and Henry F. Campbell, Augusta, Ga.; R. A. Kinloch, Charleston; Hunter McGuire and James L. Cabell, Richmond; Christopher Johnston, Baltimore; W. W. Dawson and P. S. Conner, Cincinnati; David Yandell, Louisville; Samuel D. Gross, S. W. Gross, John Ashhurst, Jr., W. W. Keen, and T. G. Morton, Philadelphia; Solon Marks, Milwaukee; R. Beverly Cole, San Francisco, and J. R. Weist, Richmond, Indiana, all distinguished as surgical practitioners, writers, or teachers. Of these surgeons of our country at that period, of the work accomplished by them, and of the influence exerted by the Association since its organization, Dr. P. S. Conner, one time President, and one of the survivors of the

original Fellows, thus writes: "I join you most heartily in appreciation of our early associates and recognition of the value of the work done and influence exerted by them. American surgery to-day owes much to the American Surgical Association, and our literature has been much enriched by the contributions of those who are now but a memory."

As ordered, the next meeting was held in the city of Richmond, on May 5, 1881, at which nineteen Fellows were present and no scientific business was transacted. The Committee on Revision of the Constitution and By-Laws reported several amendments, which were adopted, the most important of these consisting in the change of the name from the American Surgical "Society" to that of the American Surgical "Association," and those constituting the membership being designated as "Fellows" instead of "Members." The initiation fee was reduced from twenty-five dollars to ten dollars, and it was ordered by vote that the difference, fifteen dollars, should be returned to those who had paid the larger sum. A subsequent alteration in the By-Laws fixed the sum at fifty dollars, where it now stands.

Two surgeons who had been invited by the circular letter to participate in the organization of the Association, but who could not be present at the meeting held for that purpose in New York, were permitted to sign the Constitution as original members, this act making the total number forty-six. Some feeling of discouragement was manifested at the absence of any scientific business, but this was soon dissipated by the encouraging words of the President, who called attention to the fact that all scientific bodies required time to perfect an organization, and he expressed the hope that a number of papers would be presented at the next meeting. It is most interesting, as well as gratifying in the highest degree, to compare the programme of the present meeting, held in the same place and within a day, on the same date in the year, with that held twenty-seven years ago. A grand total of forty papers, on the most important subjects, engaging at the present time the attention and study of the surgeon, five of which are to be

read by title, find place upon the programme. Moreover, the presence and active participation in the scientific proceedings of the Association of a number of distinguished surgeons from abroad give a distinction to the meeting, alike honorable and gratifying. Truly, indeed, has the prophetic vision of our Founder been verified, and fortunate are those of us who are present to witness its full accomplishment.

The meeting at Richmond adjourned to meet at Coney Island, Long Island, New York, on September 13, 1882, at which time the meeting was held, and eleven Fellows were present. Several papers were read and discussed. It became evident at this meeting that there should be provided, in order to give the character to the Association it was intended to have, a definite system with regard to the scientific business, and that a reporter should be chosen, who should be an officer of the Association, whose duty it should be to take full and accurate reports of the scientific proceedings, to be published annually in a volume of *Transactions*. In order to accomplish these important objects, amendments to the Constitution and By-Laws were submitted by the writer, which provided that the President should, in addition to the other duties of his office, appoint at each meeting six Fellows, to prepare papers for the next meeting, on subjects chosen, after consultation with the appointees, and from four to six Fellows who should discuss the propositions submitted in these papers, which were to be sent to them by the writers in ample time for consideration. The reporter was to be designated as the Recorder, and was to be a member of the Publication Committee and the editor of the volume of *Transactions*. In the twenty-five years of the life of the Association this important matter has undergone several changes and re-arrangements, the object sought for being always to provide the best method for the conduct of the scientific business of the Association,—one which would invite carefully prepared papers on important subjects, not in too great number, which should receive careful discussion, in order that, through this discussion, the judgment of the Association should be rendered and published to the world. Later

revisions of the Constitution relieved the President of the duty of selecting readers of papers, and placed the duty in the hands of a Business Committee. Still later revisions of the Constitution confided the subject to the Committee on Annual Meeting, which consists of two Fellows elected by the Association, with the President, Secretary, Recorder, and Chairman of the local committee of arrangements, members *ex-officio*. This matter is regarded of so much importance as to justify its record in detail.

While there were several papers, five in number, read at this meeting, and some discussion of them, there appeared to be but little enthusiasm manifested, and discouragement as to the future success of the Association was in evidence. The committee appointed to select a place for the next annual meeting was requested by Dr. S. W. Gross and the writer to name the city of Philadelphia, they feeling that in this city it would be possible to arouse interest in the purposes of the Association, and place it upon a stable foundation. The city of Philadelphia was chosen as the place of the next meeting, and Drs. S. W. Gross, R. J. Levis, and the writer were appointed the Committee of Arrangements. At the time appointed, May 31, 1882, the Association met. There were twenty-five Fellows present, and the six Fellows appointed by the President at the last meeting read papers upon interesting subjects, which were fully discussed; in addition, two volunteer papers were read.

On taking the chair, the President delivered a short address, in which he pointed out the necessity for the founding of the Association, and denied, in earnest terms, that its organization was intended in any way to be a blow struck at the American Medical Association. He claimed that body would be strengthened by this organization, and have new life infused into it. He said: "We can hurt no association now in existence, or likely to come into existence. We can only hurt ourselves if we fail to do our duty. We hope to make the American Surgical Association an altar upon which we may annually lay our contributions to surgical science, and to show to the world that we are earnest and zealous laborers in the interest

of human progress and human suffering." He called attention to the fact that the previous meetings, with the exception of that held at Coney Island, were held to perfect the organization of the Association. The programme presented for the meeting promised important scientific work. He referred to the importance of the social features of the annual reunions. In this direction, the Committee of Arrangements in charge of this meeting had made ample provision. In the executive session, on the concluding day of the meeting, the Secretary was, on motion, instructed to cast an affirmative vote for fifty candidates for election as Active Fellows, and six as Honorary Fellows, whose names had been selected, after informal consultation, on the part of the Council and Committee of Arrangement. This action, which, at one stroke of the pen, as it were, extended the list of fellowship to ninety-six, within four of the constitutional limit, was an unusual procedure on the part of a scientific body. It was largely the result of the enthusiasm engendered by the pronounced success of the meeting, scientifically and socially. The feeling was unanimous that the Association had been successfully launched, and had taken its place as a recognized body in the surgical world. Inspired, possibly, by the same feeling, an amendment to the Constitution was offered increasing the limit of Fellowship to one hundred and fifty. This amendment was very wisely laid on the table; subsequently, on motion, it was taken from the table and ordered to lie over until the next meeting for action. The effort which manifested itself on this occasion to increase the fellowship of the Association was finally successful, a few years since, in increasing the number to one hundred and twenty-five, a happy compromise. The provision made by amendment to the Constitution for a class of Senior Fellows, in addition to the two already provided for, Active and Honorary, has given a very elastic limit to the Active Fellowship, and one which, while it will not limit the number of those eligible for active work, will keep it near to the original limit of one hundred Fellows. The intention of the Founder of the Association, with respect to the character of the organization

he desired to found, was expressed wisely in the limitation of membership incorporated in the original draft of the Constitution. He sought to secure in the fellowship of the Association qualifications in the individual, not length in the roll-call. The limitation in fellowship fixed for the Association, gave it at once a standard of excellence and of honorable distinction, which stimulated worthy ambition and made admission into it an honor to be sought after.

An election for officers was held, and Dr. Gross was chosen for the fifth time to fill the high office of President. The city of Cincinnati was named as the next place of meeting, which was to be held on May 31, 1883. At this meeting sixteen papers, six regular and ten volunteer, were read and discussed. The amendment to the Constitution, in order for action at this meeting, fixing the limit of Active Fellowship at one hundred and fifty, was defeated. A resolution was adopted providing for a dinner at the future meetings of the Association, to be arranged by the Committee of Arrangements and to be paid for by Fellows participating therein. This dinner was given at a number of meetings, but was finally abandoned. The desire entertained by the Founder of the Association to include in the programme of the meetings a function of this character would seem to be worthy of consideration. A formal dinner is the climax of entertainment, and is, the world over, the accompaniment of the assemblages of the eminent men composing learned bodies in art, in science, in statecraft, in commerce, and in every and all associations of men engaged in carrying on the work of the world. The function might assume, in our Association, the form of a reception, to be held by the presiding officer, which would afford an opportunity for social intercourse among the Fellows, and would not only be enjoyable, but of service in promoting good fellowship and harmony in its work.

When the time for the election of officers arrived, Dr. Gross, in a few feeling remarks, declined to be again a candidate for the office of President. He thought it very desirable, and for the best interests of the Association, that there should

exist a system of rotation in the office. Such a plan would result in giving to the Association the benefit of new methods of administration, the infusion of fresh spirit into its work, the avoidance of control by routine and tradition. It was a source of great pride and gratification to him to see the Association in such a prosperous condition. He felt that the ambition he had cherished with regard to its foundation and successful beginning had been fully realized, and he wished to place into other hands the honors of office and the responsibilities of its further development and growth. That in coming years it would continue to maintain the high standard which had been fixed for it, and that it would exert always a most beneficial influence on surgical science in this country, he did not doubt. In a voice choked with emotion, he bade the Association an affectionate farewell.

In response to the words of parting spoken by the President, Dr. David Yandell, in most eloquent terms, expressed the feelings of regret entertained by the Fellows of the Association on learning of his decision to lay down the honors of office. His master mind, he said, had brought the Association into existence, and his master hand had guided its progress to this period of its life. With sentiments of high esteem and affection, to which words fail to give adequate expression, he bade him, on behalf of his associates, farewell.

Dr. E. M. Moore was elected President, a few candidates for Fellowship were elected, and the Association adjourned to assemble in Washington, on April 3, 1884. It would seem appropriate to limit the chronicles of the early meetings of the Association to those over which our Founder, as the first President, presided. Some interesting events, however, transpired at the meeting which succeeded his retirement, which was held in the city of Washington on April 3, 1884, which are worthy of record. There were forty-three Fellows present, and thirty papers were presented, eighteen of which were read and discussed, and six were read by title. The number of Fellows present, and the number of papers presented, were the largest of any of the meetings yet held. At this meeting the

resignations of three Fellows, two Active and one Honorary, were presented and accepted, this action being in response to the request of the Association, by reason of alleged violations of the Code of Ethics of the American Medical Association, which had been adopted and incorporated in the Constitution of the Surgical Association. Since then this clause of the Constitution has been, very wisely, expunged. An event which caused a feeling of much sadness was the illness of Dr. Gross, which unhappily proved to be his last. Desiring to give evidence of his continued interest in the scientific work of the Association, he had sent a paper, prepared in the beginning days of his illness, on "Wounds of the Intestines," which was read by Dr. T. G. Richardson, of New Orleans, one-time his student. Telegrams expressive of the great regret felt by the Fellows of the Association, and of the hope of his speedy recovery, were sent to him by the President. On account of the illness of Dr. Gross, the annual banquet was omitted.

A most noteworthy event of this meeting was the presentation by the Recorder, Dr. J. Ewing Mears, of the report of the Committee of Publication, giving an account of the publication and issue of the first volume of the *Transactions of the Association,* the edition numbering five hundred copies. This volume contained five hundred and sixty-eight pages, and included all of the papers read at the meetings held at Coney Island, Philadelphia, and Cincinnati, thirty-two in number, with the discussions, and seventeen illustrations.. The cost of the volume was $1393.63. It had been distributed to the Fellows of the Association, Active and Honorary, to medical libraries in this country and abroad, complimentary copies were sent to distinguished members of the profession at home and abroad, and one hundred copies were deposited for sale. Before the binding of the volume was completed, the Recorder sent to Dr. Gross a copy of the unbound leaves, and received from him a note commending it as a volume worthy of the Association, and concluding his note with this injunction: "Don't cut the leaves," which was obeyed; and the first volume was issued with uncut leaves.

On retiring from the office of President, Dr. Moore called attention to the work the Association had accomplished during the session just completed, and pronounced it good. He felt called upon, however, to state that the provisions of the Constitution had been violated, inasmuch as thirty papers had been presented, twenty-four of which had been read in full and discussed, and six read by title; instead of only six, or two each day, as therein provided for. He earnestly recommended that in the future this clause of the Constitution be strictly complied with, since it would lead to the presentation of more carefully prepared papers and afford more time for their reading and discussion. "This," he said, "is a most important matter, and should claim the earnest attention of the Association. We desire quality not quantity."

A feeling having been expressed that the interests of the Association would be promoted in having a permanent place of meeting, it was ordered by vote that in the future the meetings should be held each year in the city of Washington, at the time fixed on the adjournment of this session. This was done for a period covering eight years, until the year 1892, when it was decided to return to the peripatetic or itinerant method, assembling every third year in Washington, at the time of the meeting of the Congress of Physicians and Surgeons. While much that is interesting and instructive is to be seen and enjoyed at the various places of meeting of the Association, crowned on the present occasion by social events of most gracious courtesy, it is an open question whether a fixed place of meeting would not contribute to a more serious execution of its business, its real business, its scientific work. One of the constituent societies of the Congress, that of the American Physicians, has adopted this plan, and, I believe, it is the custom observed generally by scientific bodies abroad.

The selection of a permanent meeting place for the Association might result in the future years of its existence in the erection in the city of Washington of a building suitable for its purposes, provided with an assembly hall, a banquet-room, and other rooms for the meeting of the Council and committees

intrusted with its business affairs. As years increase, the surplus volumes of our *Transactions* and the archives of the Association will accumulate, and should have quarters in which they may receive careful preservation. A movement begun at this time, the termination of the first quarter of a century of the existence of the Association, may secure sufficient funds to make a beginning. Contributions and endowments in years to come may assure the realization of the project. The advantages which will come to the Association in carrying out a plan of this character may not be fully foreseen, but that they will come would seem to be undoubted. It will give solidity and dignity to our Association to be an incorporated body quartered in a permanent abode in the capital city of our great and growing country. Should not American surgery have an imposing temple upon whose walls shall be emblazoned the names of those who in the past have been its pioneers, and who have, by their achievements, made its history, honorable above reproach, and enduring in its character?

With this account of the early meetings of our Association, and of the more important events which transpired in the early days of its life, we may rest in our detailed report. In the meetings which have followed, in each year, important work has been done. Upon the subjects of surgery which have claimed the attention of the surgical world papers have been written, discussions held, conclusions determined, and published to the world.

It will be interesting to place on record the titles of some of the papers read and discussed at the early meetings of the Association.

Among them, by Dr. S. W. Gross, "The Influence of Operations upon the Prolongation of Life and Permanent Recovery in Carcinoma of the Breast."

By Dr. E. M. Moore, "Report of Cases Illustrating the Conditions of Luxation of the Ulna in Connection with Colles' Fractures."

By Dr. John H. Packard, "Esophagotomy without a Guide."

By Dr. Moses Gunn, "Treatment of Fractures of the Skull, Recent and Chronic, with Depression."

By Dr. R. J. Levis, "Treatment of Transverse Fracture of the Patella, with the Object of Producing Bony Union."

By Dr. J. R. Weist, "Foreign Bodies in the Air-passages—A Study of 1000 Cases to Determine the Propriety of Bronchotomy in such Accidents."

By Dr. W. T. Briggs, "The Antiseptic Treatment of Wounds after Operations and Injuries." Read at the meeting in 1882.

By Dr. J. C. Hutchison, "A Résumé of the Etiology, Pathology, Diagnosis, and Treatment of Morbus Coxarius."

By Dr. Nicholas Senn, "Intracapsular Fracture of the Neck of the Femur with Bony Union."

By Dr. J. Ewing Mears, "The Intraperitoneal Method of Treating the Pedicle in Ovariotomy."

By Dr. C. B. G. Nancrede, "Have we Any Therapeutic Means as Proven by Experiment, which Directly Affect the Local Processes of Inflammation?"

By Dr. B. A. Watson, "Lister's System of Antiseptic Wound Treatment versus its Modifications."

By Dr. T. G. Richardson, "The Use of the Trephine in Traumatic Empyema Associated with Thoracic Fistula."

By Dr. Samuel D. Gross, "The Value of Early Operations in Morbid Growths."

By Dr. Basil Norris, Surgeon, U. S. A., "Dislocations of the Astragalus."

By Dr. P. S. Conner, "Excisions of the Tarsus, with a Report of Two Successful Removals of the Entire Tarsus."

By Dr. Solon Marks, "Trephining the Sternum for the Removal of a Foreign Body from the Anterior Mediastinum, with a Report of a Case."

By Dr. S. W. Gross, "A Case of Nephrectomy for Medullary Carcinoma, and Partial Cholecystectomy for Calculus in Same Subject."

By Dr. J. Ewing Mears, "Closure of the Jaws and its Treatment by a New Method of Operation."

By Dr. Henry F. Campbell, " Strictures of the Esophagus, Their Nature and Treatment, with Cases."

By Dr. Samuel D. Gross, " Wounds of the Intestines."

By Dr. L. McLane Tiffany, " A Contribution to the History of Ligation of the Common Femoral Artery."

By Dr. B. A. Watson, " An Experimental Study of Anesthetics."

By Dr. C. B. G. Nancrede, " Surgical Interference in Cerebral Abscesses."

By Dr. S. W. Gross, " Gastrostomy, Esophagectomy, Internal Esophagotomy, Combined Esophagostomy, Esophagectomy, and Retrograde Divulsion in the Treatment of Strictures of the Esophagus."

By Dr. Nicholas Senn, " Experimental Researches on Cicatrization in Blood-vessels after Ligature."

By Dr. J. Ewing Mears, " A Contribution to our Knowledge of the Pathology of Trifacial Neuralgia, with the Report of a Case in which Three Inches of the Inferior Dental Nerve was Excised," with the suggestion, for the first time made, as stated by Krause, of the removal of the Gasserian ganglion for permanent relief in such cases.

By Dr. John B. Roberts, " The Localization of Perinephric Inflammation, by Means of Clinico-Anatomical Study."

By Dr. J. Collins Warren, " The Healing of Arteries after Ligature."

By Dr. Nicholas Senn, " An Experimental and Clinical Study of Air Embolism."

By Dr. Christopher Johnston, " Diagnostitial Laparotomy."

By Dr. Harold C. Ernst, by invitation, " A Consideration of the Bacteria of Surgical Diseases."

By Dr. Roswell Park, " A Case of Lipoma of the Testes, Weighing Four Pounds, a Successful Nephrectomy for Fibrocystic Disease of the Kidney in a Boy, aged Twenty-three Months."

The limit in time, for the reading of papers and for discussions, has been from time to time a subject for decision.

At the meeting in 1885 it was moved to limit the time for the reading of a paper to thirty minutes. A motion to amend was made to limit the time to forty-five minutes, and, finally, it was moved to limit the time to one hour, which was adopted. At present the time limit is fifteen minutes; a significant change, and one open to discussion as to whether it is quite just to the writer of a paper, who has given time and work to its preparation, to be compelled, by the time limit, to stop the reading at, possibly, the most important part, and thus fail to bring the subject before the Association in proper form for intelligent and full discussion. Better, fewer papers with ample time for their reading and discussion, than a mass not fully read nor discussed in a proper way.

A most notable event, reference to which should not be omitted, occurred in the movement which had its origin in the Association, and which resulted in the foundation of the Congress of American Physicians and Surgeons. To the zealous efforts of Dr. Claudius H. Mastin, Fellow of the Association and one time its President, the Congress owes its existence. At the meeting of the Association held in Washington, April 28, 1886, Dr. Mastin presented a communication in which it was suggested that action be taken by the Association to secure the formation of a Congress of American Physicians and Surgeons by the union of the nine special societies then existing. After the reading of the communication and some discussion of the project, a motion to lay it on the table was made, and defeated. On motion then made by the writer, the Memorial was referred to a special committee consisting of Drs. Christopher Johnston, W. T. Briggs, and the writer, with instructions to report during the session. The Committee reported as follows: "That it views with great satisfaction the perfection of a plan through which the meeting of the special associations named in the Memorial, in the city of Washington at the same time of the year, may be accomplished, and the meeting of all of these associations in general assembly on such days as may be determined for the purpose of addresses upon the general subjects in medicine. Such meetings to be held without any

formal organization, through which the associations meeting will sacrifice their autonomy." The Committee presented a resolution asking for the appointment of a committee of five Fellows, authorized to confer with committees of other associations interested in the adoption of a plan of a convention, and report at the next meeting. The resolution was adopted, and Drs. Claudius H. Mastin, Charles T. Parks, J. Ford Thompson, Nicholas Senn, and the writer were appointed members of the committee.

In due time the Congress was organized, and it holds now its meetings every third year in the city of Washington. Of the great influence exerted by it upon the progress of medicine in our country there can be no question; in one organization it unites the workers in all of the special branches of medicine.

Dr. Reginald H. Fitz, President of the Congress at the last meeting, writes: "I believe in the Congress as a means of promoting acquaintance between representative men in the various parts of the country. Progress in medicine depends upon the individual worker, and encouragement comes from the Association."

Another event of special interest to the Fellows of the Association should be noted—the erection of a bronze statue of the Founder of our Association in the city of Washington. The funds necessary to accomplish this object were contributed, in part, by the Government, which not only gave the site, but appropriated $1500 for the pedestal, by the Fellows of the Association, by the Alumni Association of Jefferson Medical College, by members of the medical profession throughout the country, and by friends outside of the profession. The site of the monument, near to the Smithsonian Institution and to the Library of the Surgeon-General of the United States Army, is well chosen, and affords an opportunity to those who visit these depositories of scientific lore to look upon the features of one who filled an eminent position in his Profession and achieved, through his labors, enduring honors.

Our Association returns to this city, the capital of the

historic commonwealth, which was the birthplace and the home of George Washington, who will ever live in the hearts of the people as the Father of his Country, to celebrate its silver anniversary. In commemoration of this happy event, its loyal sons, bearing tokens of devotion, come to pay homage at its Court, to testify in terms of congratulation to the great work it has accomplished, to honor the name it has given to American surgery, to speak for the future the words of hope, and to renew their pledges of loyalty to the promotion of its high aims.

We, the few survivors of those who began the work of the Association, bring wreaths of victory to lay upon its altar, the emblems of faith which has been well kept, of work which has been well done. For them, and in their name, we ask that the high ideals cherished by our illustrious Founder may ever control the endeavors of our Association, and be the guiding star of its destiny.

PSYCHICAL END-RESULTS FOLLOWING MAJOR SURGICAL OPERATIONS.*

BY JAMES G. MUMFORD, M.D.,

OF BOSTON, MASS.

ASSISTED BY JOHN B. HARTWELL, M.D.

Said John Hunter to a patient with an obstinate running sore, who was brought to him in consultation: "And so, sir, you have an obstinate running sore."

"Yes, Mr. Hunter."

"Then, sir, if I had your obstinate running sore I should say, 'Mr. Sore, you may run and be damned.'"

A patient of my own, two years convalescent from a fractured patella, lived in a condition of fancied pain, in despondency and worry lest he should never be able to resume his vocation as a mounted policeman. The seriously flippant suggestion that he lock his worry in a bureau drawer, and mount his horse daily, restored him to the force in less than a fortnight.

Last year Dr. VanderVeer reminded us of worry as an interesting and possible etiological factor in the development of breast cancer.

Such anecdotes and conceptions are familiar to us all; and the experienced surgeon of reflective temperament doubtless considers the psychic elements in his cases; but I doubt if we are aware always how deeply significant those elements may be in controlling the return to health of a surgical patient. Rather are we wont to accept the patient from the hands of his physician; to shrug perhaps at what we are pleased to call his neurotic state; to proceed with the operation if the obvious lesion warrants it; then, with an anatomical cure established, to shift the case back upon the weary physician for the tedious struggle back to health.

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* Read before the American Surgical Association, May 5, 1908.

I do not maintain that we should refuse to operate upon such discouraging cases. On the contrary, I believe, as Dr. White long ago taught, that such operations—the operation *per se*—do great good, and are important therapeutic agents. My thesis is that we should appreciate clearly the types of individuals liable to suffer from post-operative psychic disturbances, and the surprisingly large number of such persons; that we should perform the operations, of intelligent purpose; and most of all that we should recognize our ability to aid in the after-treatment, and should bear our share of its responsibility.

With such thoughts in mind I have made a careful, systematic study of a large group of general hospital patients, who were operated upon between seven and nine years ago. The task has been laborious and at times discouraging. Allow me a word about the character, scope and method of the investigation.

I undertook to select 500 consecutive mutilating operations of expediency; excluding all emergency cases, such as those of acute appendicitis and extra-uterine gestation; all traumatic cases and cases of malignant disease; cases of plastic surgery, such as hernias and perineorrhaphies; and such cases of chronic appendicitis as were not giving rise to mild symptoms at least, at the time of the operation; 500 cases of major operations; but how shall we define a major operation? The Century Dictionary tells us it is an operation involving some danger to life. What operation does not involve some danger to life? The term is as hard to define as is the term gentleman. We all think we know the breed, and we let it go at that. I sent for the patients and corresponded with them. As one would expect, a majority did not respond, but I was enabled to study satisfactorily 129. Nearly all of these 129 were unusually intelligent persons, belonging to our best class of hospital patients; and they furnish figures sufficient on which to base just conclusions. I believe I undertook my task with an open mind,—certainly with no intention to prove a hypothesis.

Certain of my figures are interesting, though the rehearsal of figures is always somewhat dreary. There are 91 women in the list of correspondents, and 38 men only; for men in hospitals are more commonly the victims of trauma than are women. Further, under the limitations of my search I found that a large majority of both men and women in my completed list had been operated on for lesions of the generative organs,—68 of the 91 women; 23 of the 38 men. The remaining 38 patients had suffered from such miscellaneous disorders as gall-stones, chronic appendicitis, benign tumor, goiter, loose cartilage in the knee joint, joint tuberculosis, renal tuberculosis and so on through a long list.

As for the persons afflicted with diseased sexual organs (and I include the female breast in this group of organs), of the 68 women the diagnoses were: ovarian tumor, 22; uterine myoma, 19; salpingitis, 11; fibrous tumor of breast, 7; cystic tumor of breast, 6; menorrhagia necessitating hysterectomy, 1; hydrosalpinx, 1; procidentia, 1. Total, 68.

Of the 23 men with diseased sexual organs the diagnoses were: varicocele, 8; hydrocele, 7; tuberculous testis, 5; hypertrophy of prostate, 2; benign tumor of scrotum, 1. Total, 23.

With such figures before us, few as these figures are, we must consider the significance of certain clinical terms. What is the meaning of the words *cure, anatomical cure, psychical result?* I take it that a cure is the important end of all therapeutic endeavor; a perfect cure is the *summum bonum,* but is it not true that a large proportion of our cures are relative only? The man with a disabling recurrent appendicitis is absolutely cured of all pain and digestive distress through the removal of his appendix; the man with gangrene of the foot is relatively cured by amputation, though he be left maimed and halting. The woman with an ovarian cyst enjoys an anatomical cure when the tumor has been excised, and the wound has healed kindly and soundly, though an unessential organ has been removed. All these are clinical cures; are cures from the surgeon's point of view; but just here there enters into the problem an element of wide-reaching metaphysical

significance. The ills of life, like all the so-called facts of life, are in direct relation, and are proportionate to our experiences. The man who has just lost his appendix, if he lacks poise and clear vision, feels that he has been through a grievous crisis, that he has suffered a great cruelty in the operation, that the sanctity of his vitals has been violated, and that he can never again be what he was. Many persons hold that view, I find.

The man who has lost his foot may find little comfort in his freedom from pain and impending death. His old life is gone. He must readjust himself to new circumstances of existence. His relations to his environment must be recast. He must limp, a cripple, through the remainder of his life, bearing with him an unsightly stump and a grievous scar to fret and distress him.

The woman whose ovary was removed, useless though that ovary may have been, believes herself to have been unsexed; she has heard tales of changes in temperament; of coarsening features, of mannish tendencies. Or, perhaps, she thinks a full set of ovaries essential to sound health and the bearing of womanly cares. She looks forward to some mysterious ill-defined change in herself, or to invalidism; and the reassuring farewell words of the surgeon fail to turn her from the expected melancholy course. Strong character and optimism are needed to overcome these tendencies of environment and condition unless aid be brought from outside sources.

How then shall we define a *cure?* I protest that a cure consists only in returning a man to that state of physical and mental health which shall enable him to live his life, to accomplish his wonted work, to adapt himself to his environment in vigor of body, and in freedom from pain; with his normal functions undisturbed; with his mind unclouded, buoyant, assertive. That is the perfect cure, but it is a cure not easy of attainment. A more common and reasonable condition of cure is a state of relative comfort and efficiency; with little pain and distress; with infrequent anxiety; with renewed if imperfect confidence in the bodily powers.

By the term *anatomical cure* we imply a sound wound-healing and a restoration of the bodily functions so far as such restoration may be compatible with the loss or damage to members and organs.

Psychical results are related to the subjective mind. Their bearing upon the cure concerns the patient not in proportion to anatomical perfection, or to potential physical and intellectual capacity, but rather to what he himself feels to be his perfection or capacity; and just in so far as his objective intelligence is feeble or has become enfeebled, just so far is he fated on the one hand to remain a wreck, or on the other hand to refit his shattered being. We must teach ourselves to look to the ultimate prognosis. It is not what we are, it is what we think ourselves to be. That is the sum total of the old argument.

Such conceptions lead us to a fair and just estimate of the results of surgery; and with such conceptions in mind we study with renewed interest the story of a large and important group of surgical patients, bearing in mind also a constant endeavor, in estimating psychical end-results, to distinguish actual anatomical failures from psychical failures due to the fact of operation in itself,—to the patient's mental distress that an operation was performed, to his skepticism, to his belief that it aggravated the disorder, to fear that another operation may impend.

There were then 39 men in our completed list; we shall consider first the men, and then the women. Of the 39 operations, 7, or 18 per cent., were unsuccessful in the end; shall we call them failures? All of these failures were *psychical* failures, and all of the operations were on the genital organs,—for varicocele, for hydrocele, for tumor of the scrotum. These seven patients were young men, apparently vigorous. They tell us that they "feel worse than ever." They complain of "pain, weakness, and feeling miserable and good for nothing," that there is "loss of will power," and that they are "weaker than before." There were 23 operations of this genital class,

so we find that 30 per cent. of such operations on the genitalia may result in failures.*

Such a finding may not surprise surgeons, but if a further analysis and consideration of the figures represent truly the average of general hospital results, we see that late psychical disturbances after operations on men are rare, and may be disregarded in our prognoses, *except* in the case of these operations on the genitalia; and that after operation on the genitalia of men we must expect persistent neurotic or psychic distress in a third of our cases.

May not these considerations induce us to amend or to alter the common assertion that psychical disturbances occur in the despised class of neurotics only? These unfortunate final invalids of my list, before operation, were no more feeble mentally and physically than were their fellows. After operation, 30 per cent. of the genital victims developed psychical ailments, while no other men on the list developed such ailments. Must we not conjecture, if we may not assert, that there is some factor inherent in these genital cases, which makes for subsequent nervous disturbances in all except the firmly balanced men? It will be objected, of course, that many men with slight anatomical lesions of the genitals seek operation for the sake of some fancied benefit, and that they are correspondingly disturbed mentally by the lack of any subsequent conspicuous anatomical improvement. Here is an interesting fact: no one of those men who were failures psychically suffered the loss of organs. Their distended veins were removed, their vaginal tunics were excised, but their testes and other essential organs were not disturbed. Shall we assume, as we seem justified in doing, that the very presence of those intact generative organs, associated with the fact of an operation, and the fear that, though sexual powers were not lost, still there remained the possibility of such loss,—shall we assume that this complex of circumstances and ideas have united to make wretched these lives? The merchant who sits

* I am aware that these figures are significant merely. They are too few to justify broad conclusions.

in his office expecting bankruptcy is an unhappy, unnerved wretch. The same merchant revives his drooping spirits and retricks his beams after the blow has fallen. And singularly enough our studies of the hospital list show us—as a comparison with the psychic wrecks—that an equal number of men who have actually lost important organs, testes and prostates, that these men have no psychical disturbances, whether or not they are anatomically cured. They have lost their testes and their prostates and they may suffer from tuberculous sinuses and incontinence of urine, but they are reasonably cheerful, vigorous and useful men.

The significant observation regarding the men in our list therefore is that those suffer especially from psychic disturbances who are left with sound functionating sexual organs, but are living in dread that the enjoyment of those organs some day may be lost to them. If this observation be true it brings us back directly to the second great fundamental fact of all life—the attitude of the sexes towards each other, and the obligation of procreation. These are elemental conceptions, outgrown by those rare individuals only, whose intellectual development may have taught them completely to subordinate the physical to the intellectual part of their being.

The women in our list furnish us with a problem somewhat similar to that of the men, but represented in larger and more complex figures. I have said that of the 91 women, 68 were operated upon for some lesion of the sexual organs, and that these operations were mutilating. If we accept our previous definition of cures, we find that 33 of these 91 operations were in some sort failures; but that 5 only were anatomical failures, while 30 were psychical failures. In other terms, 40 per cent. of the operations were failures, but 35 per cent. of this 40 per cent. were psychical failures. And bear in mind that all of these cases of psychical failure are recorded "well" at the time of their discharge from the hospital. Let us examine the cases of sexual and of non-sexual mutilation among these women: 68 of the 91 women are in the sexual list, 23 in the non-sexual list. Of the 68 in the sexual list,

25 are failures, but 24 of these are psychical failures. Of the 23 in the non-sexual list, 8 are failures; and of these 8, six are psychical failures. We remember that in our list of men there were no non-sexual failures. Perhaps these confusing figures will be more obvious if we reduce them to percentages:

STATISTICS OF WOMEN.

Total number of operations	91	
Total number of failures	37.4	per cent.
Total psychical failures	35	per cent.
Total operations on sexual organs	68	
Total failures in operations on sexual organs	37	per cent.
Psychical failures in operations on sexual organs	35	per cent.
Total operations on non-sexual organs	23	
Total failures in non-sexual list	35	per cent.
Psychical failures in non-sexual list	26	per cent.

Thrown into general terms this table means that while three-fourths of the operations in women were on the sexual organs, both sexual and non-sexual operations showed a nearly equal percentage of failures; and that in both sets of operations the psychical failures far out-number the anatomical failures. And further, women appear to be poor psychical risks after all operations, but somewhat worse after sexual than after non-sexual operations.

Let us enquire further as to the various subordinate types of those operations which have been followed by psychical disturbances, early or late:

GYNÆCOLOGICAL OPERATIONS.

	Total	Total failures	Psychical failures	Per cent. psych. failures
Ovarian cysts	22	8	8	36.4 per cent.
Myomata uteri	19	8	8	42.1 per cent.
Salpingitis	11	6	5	45.5 per cent.
Fibromata of breast	7	2	2	28.6 per cent.
Cysts of breast	6	1	1	16.8 per cent.

Our cases, not included in the table above, are too few in each class to afford instructive figures, but the results of the totals are those I have given in Table I. As for the classes in Table II, no one class is particularly striking, but in gen-

eral terms it appears that mutilating operations on the uterus and adnexæ give a worse showing psychically than do operations for non-malignant breast tumors. One asks, perhaps, on what we do base our conclusions that these patients are psychic failures. On the following circumstances: the patients are recorded as anatomically "well" on leaving the hospital, and they have been asked the following questions eight years later: (1) How long had you been suffering before your operation? and how? (2) Could you work? (3) When did you get back your strength after the operation? (4) How long after leaving the hospital before you could do your regular work? (5) Did the operation cure you completely? (6) Are you glad you had the operation? (7) Have you had any return of the old trouble? (8) Have you had any bad symptoms due to the operation? (9) Do you worry about yourself? (10) If so, why?

My conclusion that certain patients regard themselves as still unsound is founded on a careful record of their complaints. Their replies are all quite similar and are variations of such phrases as, "I am very weak, and have had no relief"; "I am greatly debilitated"; "I have been a wreck for five years"; "I have the old pain and am very nervous and weak"; "I have never been strong; am weak, nervous, tired and easily confused"; "I have poor endurance, and am more weary than before," etc., through columns of similar writing.

So much for the surface value of these studies, and in this brief paper I have been able to touch on a few phases only of our elaborate figures. If I were to leave the matter here, however, I should be giving a grossly false and pessimistic impression of the advantage of surgical operations from the patient's point of view. Nearly all of my correspondents—the most pronounced psychic wrecks even—assert that they are glad the operation was done. The persons with anatomical failures are those who regret the operation. The persons with psychic failures are feebly complacent because, as they say constantly, their physician has told them that the choice lay between operation and death or a worse invalidism.

Another and important factor in this investigation is the personal equation of the investigator. I endeavored to meet this difficulty by maintaining an unbiassed attitude and by associating with myself a critical assistant who had no special previous interest in the matter. Nevertheless I admit that other surgeons might read other interpretations into the answers we received.

I believe there is a further and striking observation to be made in connection with these studies; and an important lesson to be drawn, which should influence our practice.

Private practice will show no such large percentage of psychical failures as hospital practice shows. I say this without the figures of private practice at hand, but eighteen years of experience in such practice, and the careful following of all private surgical cases convince me that what is now an impression merely would be proved a fact.

The reason for this assumed divergence in the results of general hospital and private practice does not depend upon the types of patients. If the type of patient determined psychical results, I believe the failures in private operating would be greater than in hospital operating. The reason for the divergence is that the personal influence of the surgeon is allowed to count constantly for good in the case of private patients. This is no time for a dissertation on psychotherapy, but all men who are in any way alive to the experience and teaching of recent years, must recognize the significance of the healer's personal influence, by whatever special name that healer may be called.

The patient goes, or is sent, to a surgeon because that surgeon is assumed to be a person specially qualified to treat that patient. The relationship thus established is, or should be, one of assured confidence on the part of the patient. As a rule, and while this relationship is maintained, the progress of the patient is good. Delay in progress and the development of psychical symptoms appear after the immediate relationship is severed. Almost instinctively we recognize, or should recognize, this fact in the case of our private patients;

and we keep them under more or less constant observation until health is restored. Later, if trouble develops, or bad symptoms recur, such patients return to the surgeon, often for encouragement and reassurance only; and the benefit secured appears constantly and notoriously out of all proportion to the advice such patients receive. For such special advice to the special patient, and for the special ailment, the surgeon must be more effective than the patient's family physician even though with that physician the surgeon must be in constant and cordial correspondence. By such means only shall the surgeon bear his share of the responsibility, and realize properly the ultimate prognosis.

But the hospital patient,—how shall he share in these benefits? I confess the problem seems almost impossible of solution, as our great city clinics are constituted. Some little is now being done, perhaps, through such social visiting movements as have been attended by an interesting success, of late, at the Massachusetts General Hospital. Neurotic patients are visited by trained persons at their homes and working places. Their home life, the circumstances of their work, their worries, difficulties, and mental states are investigated; and they are given intelligently a sense of being guided and supported towards better things. The busy surgeon cannot undertake such tasks, but he may avail himself of expert assistance in these lines, and may see occasionally the worst of the cases which are reported to him. In desultory fashion I have myself tried this plan, and am satisfied that it has brought back some discouraging cases to a cheerful and useful life. It is an old story that we specialists are in danger of drifting away from the proper function of a physician,—the restoring of health as well as the saving of life. I believe that in the nature of our work we cannot with propriety act as pure material scientists only—as mere investigators, experimenters and operators. With a little added thought, and with the proper machinery of assistants and subordinate workers, we should be able to eliminate largely the considerable number of psychic failures and invalids who trace their pains to the surgeon's incomplete endeavors.

SURGICAL ASPECTS OF GRAVES' DISEASE WITH REFERENCE TO THE PSYCHIC FACTOR.*

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WE may accept as proven the fundamental proposition that if a sufficient amount of the thyroid gland in Graves' disease be successfully excised relief or cure will follow. Whether the relief or cure be complete or incomplete is dependent upon the correct or incorrect judgment in estimating the amount of gland tissue to be removed. In my earlier cases I frequently erred on the side of removing too little. The relief that follows the removal of a sufficient amount of gland tissue is comparable to the relief from withholding drugs which cause excitation. The extraordinary subjective relief is expressed largely in psychic terms. It resembles most the phenomena of good news in contrast with bad. Buoyancy supplants gloomy depression. The objective signs of improvement follow later. The psychic and metabolic phenomena are closely interwoven.

The serious barrier to surgical treatment is the immediate operative risk. This risk is not shock, it is not hemorrhage, it is not infection, it is hyperthyroidism. What produces the hyperthyroidism? Operation upon parts of the body other than the thyroid gland in acute Graves' disease is quite as fatal as operation upon the gland itself. Simple accidents occurring in Graves' cases often prove fatal. In acute Graves' disease death may be precipitated by psychic excitation, but psychic excitation cannot be separated from accidents. From the literature, from the general phenomena, from certain experiments, and from the following specific cases, were derived the methods to be hereafter proposed in operation upon these cases.

* Read before the American Surgical Association, May 6, 1908.

In the case of a young physician with acute Graves' disease not responding to the best available medical care an operation was performed. On the day of the operation the hyperthyroidism steadily increased as the hour for operation approached, it was accelerated on his way to the operating room, and culminated in a wild toxic delirium while passing through the first stage of anæsthesia. The operation was short and was technically satisfactory. The toxicity, however, was progressive and he died in the tenth postoperative hour. Temperature at the time of death was 110°.

A young woman with acute Graves' disease became delirious during the preparation for operation under cocaine. The hyperthyroidism rapidly rose, and she died three hours afterward. The temperature at the time of death was 107° and rose ¾° during the first hour after death.

Another case of acute Graves', during the preparation for operation and during the first stage of anæsthesia, became so toxic that no operation whatever was performed. The symptoms of thyroid poisoning were progressive and she died eight hours later. The temperature at the time of death was 109°, and it rose 1° after death.

These cases appeared to be chemically destroyed. They constitute a group of acute cases of the severest types—cases most urgently needing relief. They had resisted medical treatment. They had continuous elevation of temperature, the pulse rate varied from 120° to 160°, the heart was dilated, and all were acutely toxic at the time of operation.

We apparently had not the slightest control over their destiny. During this time we were operating with splendid success on subacute cases of Graves' disease,—old colloid goitre with added Graves' disease.

At this time we were fortunate in finding in our laboratories two dogs with unmistakable Graves' disease. They exhibited extreme nervousness, muscular weakness and tremor, a daily range of elevation of temperature, marked gastro-intestinal disturbances, diarrhœa and emaciation. The thyroids gave a distinct thrill and were large, soft and vascular. No exophthalmos was noted, but as this is not always a symptom

of Graves' disease in the human being it may not be a necessary symptom in dogs. These dogs, therefore, having tachycardia, temperature curve, loss in weight and muscular strength, an increased appetite and thirst, gave a good picture of Graves' disease. They furnished an unusual opportunity for carrying out a course of experiments. Each dog was observed for several days to determine as nearly as possible his daily phenomena. The animal was then subjected to various forms of psychic excitation, such as fear and anger. One animal was thrown into a state of marked excitement by fear. When he was frightened either with a whip or in various other ways, he would show, after about six hours, a marked rise of temperature, increased tachycardia, trembling, gastro-intestinal symptoms and even diarrhœa. The temperature then gradually fell, the mental symptoms subsided and the tachycardia diminished and the dog returned to his former condition. It was found that anger in the absence of fear also caused toxic symptoms. Following these forms of excitation the animal exhibited symptoms comparable to those occurring in the human being with Graves' disease. To make the parallel closer we planned anæsthetizing the dog, in the ordinary way, after first exciting him. Following this the dog showed very marked hyperthyroidism. After three days' rest the dog was given morphine half an hour before the anæsthetic, the latter was very gently administered and continued for the same period and under like conditions as in the former experiment. The dog showed no symptoms whatever of hyperthyroidism. In our judgment these experiments were parallel to the different methods of carrying out anæsthesia and operation upon human patients with Graves' disease. After repeating these experiments and performing similar ones on normal dogs, until it was obvious that we could produce a state of hyperthyroidism by psychic excitation, we then tried to produce similar symptoms by injecting in various doses the juice of thyroid glands which had been expressed by means of the Buchner press. This juice was given hypodermically at different times and in vary-

ing doses to the two Graves' dogs and to normal dogs, so that, in all, 10 dogs were injected. The effect upon the two groups of animals following the injection was very marked. In the dogs with Graves' disease the symptoms appeared earlier and lasted longer and with greater severity than in the normal dogs. In them an injection caused a rise of temperature, appearing after six hours and continuing from three to four days and in one case 10 days. The symptoms in all of the dogs following the injection were those of hyperthyroidism, but they were more marked in the dogs with Graves' disease than in the normal. As a control the juice from a number of other organs, namely, the kidneys, liver, etc., was administered in 20 times the dosage of that of the thyroid juice, but it was found that it produced no symptoms that could be confused with those of hyperthyroidism. The observations were carefully made, the laboratory was kept open day and night, every two hours observations were taken, and there was little chance for error.

These experiments in the laboratory corroborated clinical observations previously made and we formed the following hypothesis: that in Graves' disease the most powerful factor producing hyperthyroidism is psychic excitation: that in some way, either directly or indirectly, psychic excitation discharges into the circulation an excessive amount of thyroid secretion, which, in itself, may cause death; that the greatest factor in the mortality is not the operation *per se*, if well done, but what has occurred before the operation. In other words, at the time the surgeon makes his first incision the fate of the patient has been already sealed.

If, then, Graves' disease is surgically curable, and if one of the greatest factors in the surgical risk is psychic excitation, the operation should be performed without the patient's knowledge. Such an operation was accordingly planned and found to be readily accomplished by securing from the patient consent to enter the hospital to be treated either medically or surgically as I thought best, without further discussion. On entering the hospital a non-operative routine treatment is first

employed. The object of this treatment is that of minimizing the disease phenomena and studying the case. In addition to the routine, consisting of baths, diet, etc., every morning my trained anæsthetist, who is gentle and tactful, goes through the complete form of administering anæsthesia under the guise of inhalation treatment. On the ether mask are dropped solutions of volatile oils. The patient's friends are told that the date of operation would be determined by the patient's condition. The clinical phenomena in these cases run an uneven course. Within a few days or a week we usually recognize the cycles of the disease. In the optomum portion of this cycle operation is performed. The evening prior to operation the patient is given bromides; in early morning if the conditions are favorable for operation a hypodermic of morphia is given. The shades of her room are kept drawn and absolute quiet maintained. In this manner the patient is brought as nearly as possible to a negative psychic state. The operation is done at an early morning hour. At this time the anæsthetist repeats the so-called inhalation treatment. The volatile oils are again dropped on the cone and the patient is told that this inhalation will be stronger, and that possibly a sore throat may result, but that the doctors say that this will be the last inhalation required. Gradually the ether is added drop by drop and imperceptibly the patient passes into the second stage of anæsthesia. She is then promptly sent to the operating room, and the operation is performed in the usual way. The only change recently made in the technic is that of securing the blood vessels by means of a long needle threaded with catgut, at the four poles of the gland tissue near the posterior capsule, leaving a portion of the gland. After tying these four ligatures the principal blood supply of the gland is controlled. The gland tissue is then cut away leaving only portions of each lobe. After this the raw surface is treated with very hot water, almost boiling, to control and destroy the superficial secretion and minimize oozing. The operation is performed with the least possible trauma upon the gland. The results are best appreciated by placing them in contrast

with those of other methods and with those following operations for other affections of the gland.

Among 225 operations upon the thyroid gland 142 were for benign tumors or hypertrophies. Among these there was but one death. Among 28 cases of Graves' disease operated prior to the adoption of the present method the mortality rate was four. In the 13 cases operated by the new method, all of which were of a fair or a high degree of intelligence, and nine of which were of the severe toxic type, we succeeded in every instance in performing the operation without the patient's knowledge. The pulse rates prior to and during the anæsthesia and operation showed but little change. Sometimes the pulse rose a little, at other times it fell. The usual abrupt circulatory changes attending operations for this disease did not appear. Four of these cases were of the bed-ridden type, manifesting a running fever, a pulse rate from 120 to 170, acute dilatation of the heart, acute gastro-intestinal disturbances, and violent psychic storms. They were no less severe than the four fatal cases previously mentioned. There was the usual post-operation goitre rise in temperature and in pulse rate, but all of the cases made good recoveries.

Summary.—There is evidence to show that the thyroid gland may discharge a pathological amount of its secretion in response to psychic excitation. This does not imply an explanation of the etiology. The symptoms of Graves' disease partially or entirely disappear after the removal of a sufficient amount of the thyroid gland. The psychic factor is the most important in the surgical risk. This factor may be eliminated by "stealing" the gland. When eliminated the operative risk seems to be greatly reduced.

TREATMENT OF PERFORATIVE PERITONITIS.*

(GENERAL FREE SUPPURATIVE)

BY JOHN B. MURPHY, M.D.,

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THERE are no stomata or stigmata in the peritoneum, the endothelial lining is everywhere continuous. The importance of the peritoneum lies not so much in its great surface (17,182 square inches—nearly the same as the skin) as in its tremendous power of absorption, especially marked in the diaphragmatic and omental areas. Both the lymphatics and the blood vessels absorb fluids and soluble substances, while solid particles (bacteria, etc.) are absorbed almost entirely by the lymphatics. The peritoneal fluid has great bactericidal properties. Foreign bodies are encapsulated by the fibrin.

There are three forms of peritonitis: chemical, mechanical and bacterial. By the first is meant cases apparently without microbes.

As regards etiology, the sources of infection in over 90 per cent. of the cases are the vermiform appendix and the pylorus. An important rôle is played by the Staphylococcus albus,—it appears first and disappears last. Then come in the order of importance: the colon bacillus, streptococcus, pneumococcus, pyocyaneus, typhoid bacillus, gonococcus, S. aureus, etc.

As pointed out by the author in 1896, there is early acceleration of absorption in peritonitis with slowing later on. If we can but tide our patients over this period of accelerated absorption, all will be well. It is probable injections of nuclein, etc., before opening abscesses or infected hollow viscera, will, in the near future enable us to increase the resisting power of the patient.

The term "free" peritonitis should be used for the general, diffuse variety, and "circumscribed" for the encapsulated form regardless of size.

A typical case has pain at the onset, with nausea, tenderness,

* Abstract of paper read before the American Surgical Association, May 4, 1908.

fever, Hippocratic facies, abdominal rigidity, vomiting and symptoms of collapse. The last is always a late, never an initial symptom.

There is probably no disease, not excepting diphtheria since antitoxin has been discovered, in which changes in treatment have reduced the mortality percentage so noticeably as the modern treatment of general septic peritonitis.

The importance of the Fowler position both pre- and postoperative is underestimated. The patient should be placed in this position as soon as the diagnosis is made and kept so until convalescence is well advanced.

The relief of pus tension is the first surgical step toward retarding absorption in all acute infections. Reduction of tension must be initial and the absence of pressure continuous—these are accomplished by drainage. The entire technic of these operations for peritonitis must be accomplished in a very few minutes, *i.e.*, get in quick, get out quicker.

The proper method of administering proctoclysis (Murphy) depends on close attention to details. The retention of fluid in the colon depends entirely upon the method of administration.

Opium and coal-tar anodynes were never given in the present series of cases either before or after operation.

Ileus is a frequent and often dangerous and very annoying symptom. In the 51 cases referred to there were 6 of postoperative ileus. Of the 51 cases operated on, two were gastric perforations, 1 duodenal, 5 typhoid and 43 appendiceal. The 16th and 46th cases died; the first from a double pneumonia on the 6th day after operation; the last from a mechanic ileus.

The severity of these cases is shown by the fact that 7 had to be re-operated for circumscribed accumulations of pus in various parts of the abdomen, which with the 6 of postoperative ileus makes a total of 25.7 per cent. of cases requiring a second operation.

There were no fecal fistulæ. The time elapsing between the perforation and the operation varied considerably. In the duodenal case it was 8 hours; in the gastric cases it was 8 and 14 hours respectively. The time of perforation in the appendiceal cases was based on the sudden increase in pain, enlargement of inflammatory zone, nausea and vomiting, superposed on the already existing symptoms. On this basis a period of 40 hours

was not exceeded from the time of operation while many of them had suffered from the appendicitis for 3, 4 up to 7 days. The earliest operation was three hours after the perforation symptoms, the latest 40 hours, with an average of 22 to 30 hours.

Much of the credit for the good results is due to the family physician, as early diagnosis and early intervention are indispensable to success.

There were no deaths in the series of 51 cases from the peritonitis *per se*. When the plan of treatment outlined was first instituted the recoveries were believed to be coincidences. The number is now so large, however, and the results so uniform, it must be concluded they are legitimate sequellæ of the treatment. The results cannot be attributed to a change in the virulence of the infection, nor to any change in the patient's resistance of the individual or local immunity.

Based on the facts cited in the paper, it is believed the results in the future in these cases of general, diffuse, free peritonitis can and must be uniformly good.

This estimate involves the assumption that the medical profession will make early diagnosis, will insist on early intervention, will limit its surgical procedures to the least possible handling and trauma consistent with closure of the opening and relief of pus tension, will limit the duration of anæsthesia and the amount of the anæsthetic, will shorten the actual time of operation, will insure the continued absence of pus tension, will eliminate the sepsis already in the blood, restore the blood pressure and will inhibit absorption by position.

None of the above can be considered individually as a life saver, but each plays an important rôle in securing the present good results.

LATE RESULTS AFTER OPERATIONS FOR BENIGN DISEASES OF THE STOMACH AND DUODENUM.*

BY B. G. A. MOYNIHAN, M.S., F.R.C.S.,

OF LEEDS, ENG.

In endeavoring to arrive at a just estimate of the value of surgery in its application to the non-malignant diseases of the stomach I have gathered together the records of all the cases upon which I had operated up to the end of 1905. They are 281 in number; and may be classified into four groups:

I. Perforating ulcer of the stomach or duodenum;

II. Cases for which hemorrhage has been the immediate cause of urgent interference;

III. Cases of chronic ulcer, etc.;

IV. Cases of hour-glass stomach.

A printed form of detailed enquiry was sent out in the early part of this year to all the medical men who had very kindly referred these patients in the first instance to me. Of the 281 patients recent information is at hand in reference to 265 cases. The work of summary, analysis, and criticism has been very kindly undertaken for me by my colleague, Mr. Harold Collinson.

Group I.—*Perforation of the stomach or duodenum*: During the period mentioned, that is, to the end of 1905, I operated upon 27 cases of perforating ulcer; 18 patients recovered. In 6 cases gastro-enterostomy was performed immediately after the closure of the ulcer because of the narrowing at or near the outlet of the stomach, which this procedure had caused. One of the cases died and 5 recovered. In 2 patients symptoms due to a cicatricial stenosis near the pylorus developed within a few months, and gastro-enterostomy was necessary to afford relief. In one patient I have recently had to operate four years after the closure of a perforating ulcer, which had caused a contraction in the centre of the stomach.

* Read before the American Surgical Association, May 4, 1908.

Gastro-enterostomy was performed to the greatly hypertrophied cardiac pouch of an hour-glass stomach. In 8 cases, therefore, in a total of 18 who recovered, the operation of gastro-enterostomy has been necessary. All these cases are now reported to be quite well. In the remaining 10 cases the ulcer was placed on the lesser curvature, and in the cardiac half of the stomach in 9 instances; in one it was "prepyloric." Eight of the 9 patients are now quite well and make no complaint of stomach symptoms; from one patient nothing has been heard. The patient whose ulcer was prepyloric complains of indigestion and occasional vomiting and will probably need gastro-enterostomy.

The present condition of these patients is interesting in reference to two points: In the first place it is suggestive of the need for gastro-enterostomy in all cases of a perforating ulcer placed at or near the pylorus, in a position where the subsequent contraction in healing is likely to cause stenosis. In the second place it makes it evident that when an ulcer is placed near the lesser curvature and away from the pylorus, its excision or infolding suffices to give complete relief. Gastro-enterostomy in such circumstances is therefore not necessary at the time the perforation is treated nor is it likely to become necessary at a later stage.

GROUP II.—*Acute hemorrhage:* In the series of hemorrhage cases there were 27 patients submitted to operation, of whom 23 recovered and are alive now; reports as to their present state of health have been received from 22. One patient, who was admitted to the hospital from prison, cannot now be traced. Eighteen are reported as being "perfectly well," "cured," "absolutely cured"; in each one a complete restoration to health, good digestion and normal appetite has occurred. One case is improved in health but is rather delicate. His medical man reports, "the operation was for urgent and grave hæmatemesis and undoubtedly saved the patient's life, but he is still as he was before—weak and frail. There are no symptoms of dyspepsia." Three patients have suffered from post-operative vomiting. Two of the cases reported upon in Janu-

ary and March, 1903, had the posterior long-loop operation; in one vomiting of bile occurred infrequently for a year and then disappeared, the patient is now "quite well"; in another it has continued at intervals of 2 or 3 weeks up to the present time; the patient moreover says that she is "far better" than before and "able to work now." In the third case the no-loop operation was performed, the jejunal direction being downwards and to the right. This case is to me the most interesting of all, for it is the only case in which after the no-loop operation any bilious vomiting has occurred. The operation was in February, 1905, upon a patient seen with Dr. Nicholson Dobie and the late Dr. Dreschfeld. Bilious vomiting occurred every week or two up to 3 months ago, when it disappeared after repeated lavage. In this case after the anastomosis was completed it was noticed that the jejunum did not fit well; it seemed to be twisted above the point of union with the stomach; a remark to this effect is made in the notes written by my assistant on the day of operation.

GROUP III.—*Cases of chronic gastric and duodenal ulcer, etc.:* The patients in this class number 205; among them were 2 fatal cases, and 214 operations. For the purpose of analysis I have adopted the following classification:

		CASES	DEATHS
A.	Gastric ulcer, duodenal ulcer singly or together.....	174	2
B.	Cholelithiasis with ulcer.....	4	0
C.	Cholelithiasis causing obstruction.....	6	0
D.	No demonstrable ulcer.....	11	0
E.	Pyloroplasty	3	0
F.	Secondary operations, the primary performed elsewhere	7	0
G.	Secondary operations in cases in classes *A* and *E*.....	9	0
		214	2

Class A.—There are 174 cases—74 males, 100 females.

Gastric ulcer alone.....	39 males	83 females
Duodenal ulcer alone.....	21 males	8 females
Gastric and duodenal ulcers.....	14 males	9 females

In this group a demonstrable ulcer was found in every instance. The number of duodenal ulcers was relatively very

small in the earlier cases but has gradually increased. Latterly I have operated more frequently for duodenal than for gastric ulcer, and think it not improbable that many cases in which the lesion was formerly supposed to be in the pylorus were incorrectly classified.

Class B.—Four patients in whom ulcer was associated with cholelithiasis; three ulcers were gastric and one duodenal, and in all posterior gastro-enterostomy was performed. In three cases cholecystotomy was performed at the same time. In one case an operation had been performed 12 months previously for cholecystitis and stone in the cystic duct. Subsequently cholecystectomy was performed and a calculus removed from the common duct.

All the patients recovered and are cured.

Class C.—In six cases, cholelithiasis, or its results, were found to be interfering with the proper action of the stomach. Five patients were females, one was a male. Of these six cases, two had had cholecystotomy performed before, and adhesions had caused pyloric narrowing. In one of these, a gastro-enterostomy had also been done with the aid of Murphy's button. The stomach symptoms returned after a year, and on reopening the abdomen it was found that the anastomosis was almost closed. A second gastro-enterostomy by suture was therefore performed.

In the remaining four cases, posterior gastro-enterostomy and cholecystotomy were performed three times, and cholecystectomy and gastro-enterostomy once. All the patients recovered and are cured. In all these cases the adhesions which existed between the stomach or duodenum and the bile-passage made it impossible to say whether ulceration in these viscera existed. In all probability, ulceration was present, or had been present, in every case.

Class D.—In 11 cases, 10 primary and 1 secondary, no demonstrable ulcer was found; all the patients were females. In two of these hæmatemesis has occurred; and in several the stomach is described as being "dilated." In one case death occurred two days after operation from uræmia, and ulcer-

ation without induration was found in the duodenum, probably uræmic in origin and of very recent occurrence.

In 3 cases the patients are now quite well. In 6 cases the patients are no better, and in one improvement is "doubtful."

Class E.—In 3 cases pyloroplasty was performed. In all gastro-enterostomy had subsequently to be performed 5 months, 4 years, and 7 years afterwards.

Class F.—There were 7 secondary operations, the primary being performed elsewhere. The following table gives the details:

First Operation	Abnormal Condition	Second Operation
Posterior gastro-enterostomy with Laplace's forceps	Opening closed, return of symptoms	Posterior gastro-enterostomy with Murphy button.
Posterior gastro-enterostomy..	Long loop; regurgitation.....	Entero-anastomosis.
Posterior gastro-enterostomy..	Hernia into lesser sac.....	Reduced. Lateral anastomosis.
Posterior gastro-enterostomy ..	Long-loop; regurgitation.....	Entero-anastomosis.
Posterior gastro-enterostomy..	Long-loop; regurgitation.....	Roux's operation.
Posterior gastro-enterostomy..	Return of symptoms, opening too small	Gastro-enteroplasty.
Pyloroplasty, three cases	Pyloric stenosis.....	Posterior gastro-enterostomy.

Class G.—There were 8 cases of secondary operations, the primary having been performed by me. The following table shows the details:

Previous Operation	Abnormal Condition Found	Secondary operation	Result
Gastro-enterostomy with Murphy button	Opening closed	Post. gastro-enterostomy	Cured.
Posterior gastro-enterostomy	A long loop	Roux's operation	Cured.
Posterior gastro-enterostomy	A long loop and a small opening	Roux's operation and gastro-enteroplasty	Improved.
Anterior gastro-enterostomy	Adhesions causing obstructions below the anastomosis	Lateral entero-anastomosis	Cured.
Posterior gastro-enterostomy	Nothing abnormal; no lesion of any kind	Exploratory.....	No benefit.
Posterior gastro-enterostomy	Adhesions constricting distal limb	Enteroplasty.....	Improved.
Gastrotysis	Many adhesions and ulcer in duodenum	Posterior gastro-enterostomy	Cured.

In addition two of my cases were subsequently operated upon by other surgeons. In one case a hernia into the lesser sac was found and reduced; in another some adhesions were found and were separated.

Postoperative vomiting occurred in 22 cases, 19 primary operations and 3 secondary.

Class A.—Postoperative hæmatemesis occurred in two cases; in one a pint of blood was vomited within 24 hours of operation; no ill result followed. In a second, hæmatemesis occurred after the patient's return home on several occasions; this was a secondary operation, and no lesion was visible when I explored.

Class B.—Regurgitant vomiting of bile necessitating early operation. One case. Profuse vomiting for 3 days; quite relieved by entero-anastomosis.

Class C.—Later regurgitation due to a loop and relieved by secondary operation. Two cases treated by entero-anastomosis.

Class D.—Cases in which vomiting occurred early and has now ceased. Seven cases, treated for a time by lavage with complete relief.

Class E.—Case in which vomiting still occurs. Eight cases; all were operated upon before 1905, and in all a long loop of the jejunum was left.

Class F.—Vomiting of food occurs now. Two cases. In both the symptom was frequent before operation and has not been relieved.

Ulcers were found on the lesser curvature in 8 cases; gastro-enterostomy was performed in 7 and excision in 1. In 3 cases carcinoma occurred later in the site of what was supposed to be a chronic ulcer, and in all proved fatal. In one only slight improvement has followed the operation; in the remaining cases the patients are now quite well.

LATE RESULTS.

In 14 cases no report was furnished in 1908, but in 11 of these the patients were seen by me over two years after opera-

tion, and I have notes to say that all were well; in 3 cases no report can be obtained.

In 12 cases the patients are reported to be "no better" or "about the same." In 6 of these cases, all women, no ulcer was found at the operation, nor any evidence of obstruction. One of the cases was a secondary operation by myself, the primary operation having been performed elsewhere. I found no lesion of the stomach and closed the abdomen without doing anything further. There has been no relief from the symptoms, pain and hæmatemesis. In another case the lesion was very slight, a small scar only being found on the posterior surface. One case is an example of Finney's operation. Three suffer from vomiting but are kept fairly comfortable and free from symptoms by lavage.

In 5 there has been complete relief from the symptoms for which the operation was done, but in all there is slight very occasional vomiting, chiefly of bile. The intervals of this vary from "2 to 3 weeks" to "every few months." In all the patients have returned to work, eat well, have gained weight, and attribute the onset of the vomiting to slight or grave indiscretions in the matter of diet. In 4 of the cases the patients are "well satisfied" with the result of the operation, though their surgeon does not share their feeling of content.

In 10 cases the improvement is doubtful or has been tardy. Three of these were secondary operations, the original operation being done elsewhere. One patient was well for 2 years, then began to lose weight and to become progressively more and more anæmic. He died 4 months later of "pernicious anæmia." In one case of duodenal ulcer with the most intense hyperchlorhydria, there was a recurrence of symptoms one year later, and at a second operation elsewhere some adhesions and a jejunal ulcer (?) were found. The patient recovered and improved subsequently. The remaining patients have still some of their former symptoms, and usually have to make occasional calls upon their medical men. The chief symptom that remains is vomiting. In all the ulcer

found was small and at some distance from the pylorus, in the body of the stomach or on the lesser curvature.

Eight patients have died since operation of diseases apart from those of the stomach: One 6½ years later of carcinoma of the pancreas; one 6 years later after operation by another surgeon for carcinoma of the cæcum; one 8 months later of acute pneumonia; one 4 years later of cardiac disease; one 3 months later of acute abscess of lung; one 1 year later of cardiac disease; and one 2 years later of pernicious anæmia. In one case the cause of death three years later is not mentioned.

In 7 cases death occurred from malignant disease of the stomach occurring at the site of the ulcer. The deaths occurred 2 years, 4 years, 2½ years, 3¼ years, 1 year, 1½ years, 2½ years subsequently. The deaths in these cases are very significant. The intervals in most of them between operation and death, suggests that the condition present at the time of the operation was not then malignant, but rather that a carcinomatous invasion of the diseased part occurred at a later period. They were, perhaps, examples of ulcus carcinomatosum. There can be no doubt that in some of these cases Rodman's operation,—excision of the ulcer-bearing area,—would have been the better procedure.

Two patients died as the direct result of the operation; one from uræmia, one from acute obstruction due to hernia of all the small intestine into the lesser sac, and strangulation at the margin of the opening through the transverse mesocolon.

The final results in this group may be briefly stated thus:

Living.—Cured, 18; relieved, 5; doubtful, 9; no better, 12; no recent report, 14 (11 of these may be considered certainly as cured).

Dead.—As result of operation, 2; of carcinoma of stomach, 7; of other causes, 8.

Total number of cases, 205.

GROUP IV.—*Cases of hour-glass stomach:* There were 22 cases, comprising 7 males and 15 females. In every case

there had been previous symptoms pointing to chronic gastric ulcer. In 4 cases the history is strongly suggestive of a former "subacute" perforation, while in a third case the urgency of a perforation indicated operative measures.

The total mortality is three—one on the fourth day, from septicæmia, resulting from a strangulated rectal prolapse; 1 in the third week, from suppression of urine; 1 on the fifth day, from pneumonia.

The ulcer in the stomach was associated with duodenal ulcer in 2 cases (1 male and 1 female).

In 1 case a pancreatic cyst was also found at operation. Adhesions to the anterior abdominal wall were met with in 4 cases. Trilobed stomach was seen once.

The following operations were performed: Gastro-enterostomy alone 7 times, 1 death. Gastrogastrostomy and gastro-enterostomy 3 times. Gastroplasty alone 7 times; in 2 secondary operations were necessary. Dilatation of stricture, once. Gastroplasty and gastro-enterostomy twice, one death. Gastrogastrostomy alone, once. Gastro-enterostomy and Loreta's operation once; the patient died.

Results.—Twenty-two cases, 3 deaths; 3 secondary operations (gastro-enterostomy) for return of symptoms; 1 secondary operation, entero-anastomosis for regurgitant vomiting after gastro-enterostomy.

One patient has since died of puerperal fever. Recent reports have been received from 17, all of whom are quite well; of one no report has been heard.

A summary of the entire number of cases gives the following results:

	Total Number	Recovered	Died	Since Dead	Cured
Group 1.	27	18	9	0	16
Group 2.	27	23	4	0	19
Group 3.	205	203	2	15	159
Group 4.	22	19	3	1	17
	281	263	18	16	211

The present condition of all the patients now alive is as follows: 211 patients are cured, 9 patients are improved, 12 patients are no better, 9 patients are doubtful, 6 patients not recently reported; total, 247.

Thirty-four patients are dead; 18 as a result of the operation, 7 of carcinoma of the stomach, 9 from other causes unconnected with the disease of the stomach, or the operation performed for its relief.

Such is a brief review of the after-history in all my cases. What are the lessons to be learnt therefrom? I submit the following points:

1. The operative treatment of stomach disorders should be confined exclusively to those cases in which an organic lesion is present. Unless there is a palpable and demonstrable ulcer in the stomach or in the duodenum or some condition which hampers the proper action of the stomach the symptoms are not due to any pathological cause capable of being relieved by surgical interference. However careful our preliminary investigations may be we shall from time to time display upon the operation table a perfectly normal stomach. We must not then endeavor to cover our diagnostic disaster by the performance of an unnecessary operation upon the stomach but rather must we candidly confess that our exploration has proved negative. To perform gastro-enterostomy in such cases has, I think, been proved to lead to unsatisfactory results, whereby the operation is discredited.

2. In cases of acute perforating ulcer, the perforation should be closed or the ulcer excised. When the ulcer lies upon the lesser curvature nothing more is necessary than this. The after-history of such cases shows that they are relieved from all disabilities referable to the stomach. When the ulcer is prepyloric, pyloric or duodenal, gastro-enterostomy also should be performed. It doubtless hastens the immediate recovery of the patient by affording an easier exit from the stomach than that impeded by the ulcer, and it forestalls the almost certain onset of symptoms which only a short-circuiting operation can relieve.

3. When a non-malignant lesion is discovered the treatment appropriate to it depends upon its position in the stomach. If an ulcer be placed on the lesser curvature at some distance from the pylorus, in such a position that no obstruction is offered to the onward passage of the food, excision should be performed. In such cases the relief from gastro-enterostomy may be incomplete and it is probable that the later onset of malignant disease occurs in a large proportion of cases. In some cases, however, when the ulcer is on the curvature or on the posterior surface of it adherent to the pancreas, relief follows if gastro-enterostomy is performed on the cardiac side of the lesion. It may be that the ulcer when anchored impedes the proper movements of the stomach, or that the nerve-supply being interfered with some local paresis of the gastric wall results.

4. If the ulcer be prepyloric, pyloric or duodenal, gastro-enterostomy should be performed. It is desirable also to infold an ulcer whenever possible, for both hemorrhage and perforation have occurred from ulcers for which gastro-enterostomy has been performed months or years before. The local treatment of the ulcer is always desirable and is generally easily performed.

5. The most satisfactory method of gastro-enterostomy is the posterior no-loop operation, with the almost vertical application of the bowel to the stomach. The vertical position is that into which the jejunum falls most easily in the normal (that is the erect) position of the body. A deviation to one or the other side if slight is of no importance, and entails no untoward consequences.

6. Regurgitant vomiting occurs as a result of the "loop" operation, whether anterior or posterior. It is relieved almost certainly by an entero-anastomosis. Patients who suffer from it may be relieved entirely of all symptoms for which they originally sought relief. An operation that is mechanically imperfect relieves the original disorder though it leaves serious disabilities behind it. The vomiting of bile may be relieved

by lavage and in some patients disappears entirely after the lapse of weeks or months or even years.

7. In cases of hour-glass stomach the surgical treatment necessary presents special difficulties on account of the frequency of two lesions—one in the body of the stomach and one at the pylorus, and double operations have consequently to be frequently performed.

A STUDY OF GASTRIC AND DUODENAL ULCERS.*

WITH ESPECIAL REFERENCE TO THEIR SURGICAL CURE.

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THIS paper is limited in its scope to a discussion of gastric and duodenal ulcers with a view to presenting some facts as to their surgical cure. There seems to be much apprehension in the minds of the profession at large as to just what cases should be subjected to surgical treatment, and at what stage operation is to be recommended, if at all. In the following series the average duration of the pre-operative symptoms was over twelve years, and no patient was operated upon for ulcer until medical treatment had been tried over and over again without securing a permanent cure.

There is no conflict between medicine and surgery in this field, as only the cases that fail to yield to a *reasonable* amount of medical treatment should be considered surgically.

The physician is quite within reason in asking the surgeon as to the ultimate results of the operative treatment of gastric and duodenal ulcers. It is not enough that we show the mortality immediately following operation to be low, and the patient temporarily relieved, but two years of time at least should elapse after operation before the patient can be safely pronounced cured. The answer to the question is, however, not an easy one, as a number of factors must be taken into account.

In the earlier work some of the patients were not relieved because of technical errors which have now been corrected, and especially because gastrojejunostomy was, for a time, looked upon as a " cure all " and applied indiscriminately without regard to local conditions. In other instances of apparent

* Read before the American Surgical Association, May 4, 1908.

failure the diagnosis was questionable, as the evidence that the disease was ulcer depended upon pre-operative clinical data, rather than pathological findings at the operating table.

It can be said too that gastric and duodenal ulcers cannot be separated from their complications, so that no review would be complete on the surgical side without including obstructions, deformities, and limiting adhesions that interfere with the gastric function even after the ulcer itself has healed.

It seems wise, therefore, to present at this time all the cases of ulcer and kindred diseases of the stomach and duodenum operated upon by Dr. C. H. Mayo and myself since the first case in 1893, a period of fifteen years, but to confine the special investigation and statistics to the ulcer group.

Total number of operations to May 1, 1908, 827; total number of patients operated upon, 768. Two hundred and twenty-five cases were operated upon for benign lesions other than ulcer and are classified in the following groups:

I. Adhesions and bands the result of ulcer.

II. Secondary infectious processes such as subdiaphragmatic abscess, etc., the result of perforating ulcer.

III. Cases apparently of inflammatory origin but in which evidence that the process was ulcer proved insufficient to classify them as such.

IV. Pyloric obstruction from contracture of the pyloric muscle, valve formation, etc., apparently not due to ulcer.

V. Bullet and stab wounds, other traumatisms and foreign bodies.

VI. Benign tumors, hypertrophic pyloric stenosis, syphilis and tuberculosis.

VII. In which the stomach was opened to obtain access to the cardiac orifice for cardiospasm and benign strictures of the œsophagus. Gastrostomy, etc.

VIII. In which the duodenum was opened to obtain access to stones and tumors in the posterior wall of duodenum, papilla and ampulla of Vater.

IX. Obstructions and ulcerations of the stomach and duodenum caused by gall-stones.

X. Negative explorations of interior of stomach and duodenum.

This leaves 540 cases operated upon for ulcer of the stomach and duodenum.

ACUTE PERFORATIONS.

There were 27 patients operated upon for acute perforations. In 5, primary gastojejunostomy was also done, with two deaths. In 22, closure of the perforation was made with abdominal drainage, and but one of the 18 who recovered required a secondary gastrojejunostomy, the perforation having seemingly put an end to the disease.

Acting upon this observation, I have twice, in chronic gastric ulcer where the conditions were such that I could not excise and where gastrojejunostomy was not indicated, exposed the crater of the ulcer which in each case was found comparatively small but surrounded by a mass of indurated and scar tissue. With a sharp knife I cut out the base of the ulcer, thus producing the picture of acute perforation, then closed the defect. Just what the ultimate outcome will be I do not know, but the immediate results have been most favorable.

DEVELOPMENT OF THE SURGICAL TREATMENT OF CHRONIC ULCER.

Our experience with the surgical treatment of chronic gastric and duodenal ulcers can be divided into three stages:

First, the period previous to 1900.

Second, the period from 1900 up to and including 1905.

Third, from 1905 to the present time.

First Period.—The surgery of chronic gastric and duodenal ulcers previous to 1900 might be called the surgery of benign obstructions, as the majority of operations were for gross lesions. The relief afforded by these operations was immediate and permanent in all but a few cases where technical failure to secure good gastric drainage was at fault. The operative mortality was about six per cent.

Two varieties of operations were employed: Gastrojejunostomy and pyloroplasty. Unfortunately one-third of our cases subjected to the pyloroplasty of Heinike-Mikulicz required secondary operation. Gastrojejunostomy we then as now generally employed, but made it anteriorly with the Murphy button. The character of the complications subsequent to this operation varied from the occasional dropping into the stomach of the button to the contraction of the opening due to the traction weight of the attached intestine at the point of anastomosis. Volvulus of the loop and incarceration of the small intestine through the loop, each, however, accounted for the necessity of a secondary operation.

At the meeting of the American Surgical Association, 1902, I reported seven of these mishaps, but in spite of technical errors, operations during this early period were very successful. The Murphy button demonstrated the great possibilities of gastro-intestinal surgery and the occasional failure of the button stimulated efforts toward betterment of methods.

We learned by experience that within reasonable limits the greater the obstruction the more certain the cure, and we also learned the value of having the opening in the stomach at the lowest point (ANNALS OF SURGERY, 1902), for we noticed that after the button was placed, all of those cases in which the traction weight on the anterior gastric wall caused a funnel to form gave successful results, and, as will be shown later, the majority have remained well up to the present time—from eight to fifteen years.

Second Period.—Stimulated by these early successes, the next six years were marked by the invasion of new fields; we were no longer contented to wait for starvation through obstruction to force operation, but rather attempted to forestall this final stage and by earlier operation terminate the disability, relieving the patient from the underfeeding and pain which are such marked symptoms of the malady.

The results in this group did not compare favorably with the early period in which the problem was purely one of mechanics arising from interference with gastric drainage, or

with the third period in which technical errors had been largely eliminated and a sound pathological basis substituted for fallacious clinical observations.

The problem was approached with the knowledge gained from the operative treatment of obstruction, but when this was put into actual practice where there was no obstruction, it was very quickly found that the stomach was not a bag emptying itself by gravity, but a muscular organ which always propelled the food toward the pylorus, and that if the pyloric end of the stomach and the upper duodenum were not interfered with mechanically or otherwise by the presence of an ulcer, that the food would not pass out of the gastrojejunostomy opening, but in spite of it would continue through the pylorus. While this position was disputed at the time by eminent authorities, I believe that it is now generally accepted. In some cases, where the ulcer was situated at a considerable distance above the pylorus, a certain amount of benefit did occur, however, by reason of the passive drainage of the irritating gastric secretions through the artificial stoma during the period in which the stomach was fasting and inactive.

It was eventually discovered that ulcers which exist to the left of the pyloric end of the stomach should, if possible, be excised, but if in doing this deformity was created which would interfere with the progress of food, gastrojejunostomy should in addition be performed.

The excision of gastric ulcers was still further stimulated in that a considerable percentage of ulcers later degenerated into cancer. In 180 cases of our own in which part of the stomach was resected, cancer on ulcer base was demonstrated in 54 per cent. Ulcer of the duodenum seldom undergoes malignant metamorphosis, so that this indication for excision does not apply with the same force to duodenal ulcers.

During this second period great efforts were made to improve the technic of gastrojejunostomy. Where pyloric obstruction was present almost any method gave good results, but if no obstruction existed some of the biliary and pancreatic secretions were liable to enter the stomach, and this annoying

complication occasionally led to the necessity for an entero-anastomosis to check the disturbance.

Roux, Doyen and others invented primary operations combining entero-anastomosis in some form with gastrojejunostomy, while Eiselberg proposed to artificially obstruct the pylorus, thinking to produce the favorable conditions known to be present in obstructions.

The posterior operation gradually replaced the anterior as the popular method. The loop was eliminated, and we no longer turned the jejunum to the right, but sutured it to the stomach as it runs normally downward and to the left.

We have made over 300 gastrojejunostomies for ulcers of the stomach and duodenum by this particular method with a mortality of less than one per cent., and but three cases have required a secondary operation upon the stomach for any cause.

In all "loop" operations, anterior or posterior, the intestine is applied to the stomach downward and to the right, but in the "no loop" method we found that this sometimes caused angulation as it turned the jejunum at the duodeno-jejunal angle rather sharply from its normal position, and occasionally caused chronic bile regurgitation.

The vertical attachment of the jejunum to the stomach as originally practised by Mikulicz with a transverse intestinal incision, and by Czerny with the Murphy button, has been recently revived by Mr. Moynihan, who is now using it with the longitudinal intestinal incision. (ANNALS OF SURGERY, April, 1908.)

Technical errors were, however, not the sole cause of failure to cure. The whole subject was pathologically undeveloped; we did not always know at the operating table whether ulcer was present or not, and we failed to differentiate ulcer from non-operative diseases of the stomach, and occasionally operated upon patients who would have been better treated otherwise. In the beginning we really had little exact knowledge of the living pathology of ulcer excepting its complications: obstructions, perforation and hemorrhage. The clinical

symptomatology was based upon an erroneous pathology, teaching that chronic ulcer frequently confined itself to the mucous coat, consequently gastrojejunostomy was often done when no ulcer could be found, under the mistaken idea that an ulcer actually existed but was hidden in the interior of the stomach, and a number of patients whom the operation had failed to relieve because they did not have gastric or duodenal ulcer were recorded by both physician and surgeon as instances of operative failure to cure, instead of a ***mistake both in diagnosis and operation,*** which was the fact.

In 14 cases of our own and a number in which the primary operation was done by other surgeons, we have re-operated for trouble of this description and often failed to find any trace of an ulcer; we have, therefore, in such cases, cut off the gastrojejunostomy and closed both sides, restoring the gastrointestinal canal to its normal continuity. Strange to say that following this temporary gastrojejunostomy nearly half of the patients were relieved of their original discomfort, but sufficient time has not elapsed for us to know whether this will be permanent.

The Finney operation gave remarkably good ultimate results in pyloric obstructions, but in cases of unhealed ulcers existing proximal to or distal from the parts involved in this operation, less benefit was derived unless the ulcer lay within the zone of the operative field so that it could be coincidentally excised.

The mortality of this second period was not greatly reduced, remaining at about five per cent., largely because a number of these patients had complicated operations, and in some instances several operations, which increased the mortality; but in spite of these developmental errors the large majority of true ulcers were relieved or cured as will be demonstrated later.

Third Period.—The third period covers about two and one-half years. The doubtful cases have been eliminated, and a living pathology established which enables the surgeon to recognize the ulcer at the operating table. If the ulcer is not

actually demonstrated, no gastric operation is undertaken unless necessitated by hemorrhage.

Gastrojejunostomy is still our most valuable operation, especially for duodenal ulcer, which is the lesion in nearly two-thirds of our cases. (Fig. 1.)

The operation of Finney is chosen for pyloric strictures. (Figs. 2 and 3.)

Ulcers in the stomach at a distance from the pylorus are excised. (Figs. 4 and 5.)

If hour-glass contraction is present, the whole diseased area is excised. (Figs. 6 and 7.) If it is not possible to do this, proximal gastrojejunostomy is performed.

Calloused ulcer of the pyloric end of the stomach indicates the operation of Rodman (Figs. 8 and 9), consisting of resection of the diseased area with closure of the duodenum and independent gastrojejunostomy. (Modified Billroth, No. II, for cancer.)

The mortality of even the more complicated operations does not exceed three per cent., while the cures will, I believe, run ninety-five per cent. or over.

SURGICAL CURES OF GASTRIC AND DUODENAL ULCERS.

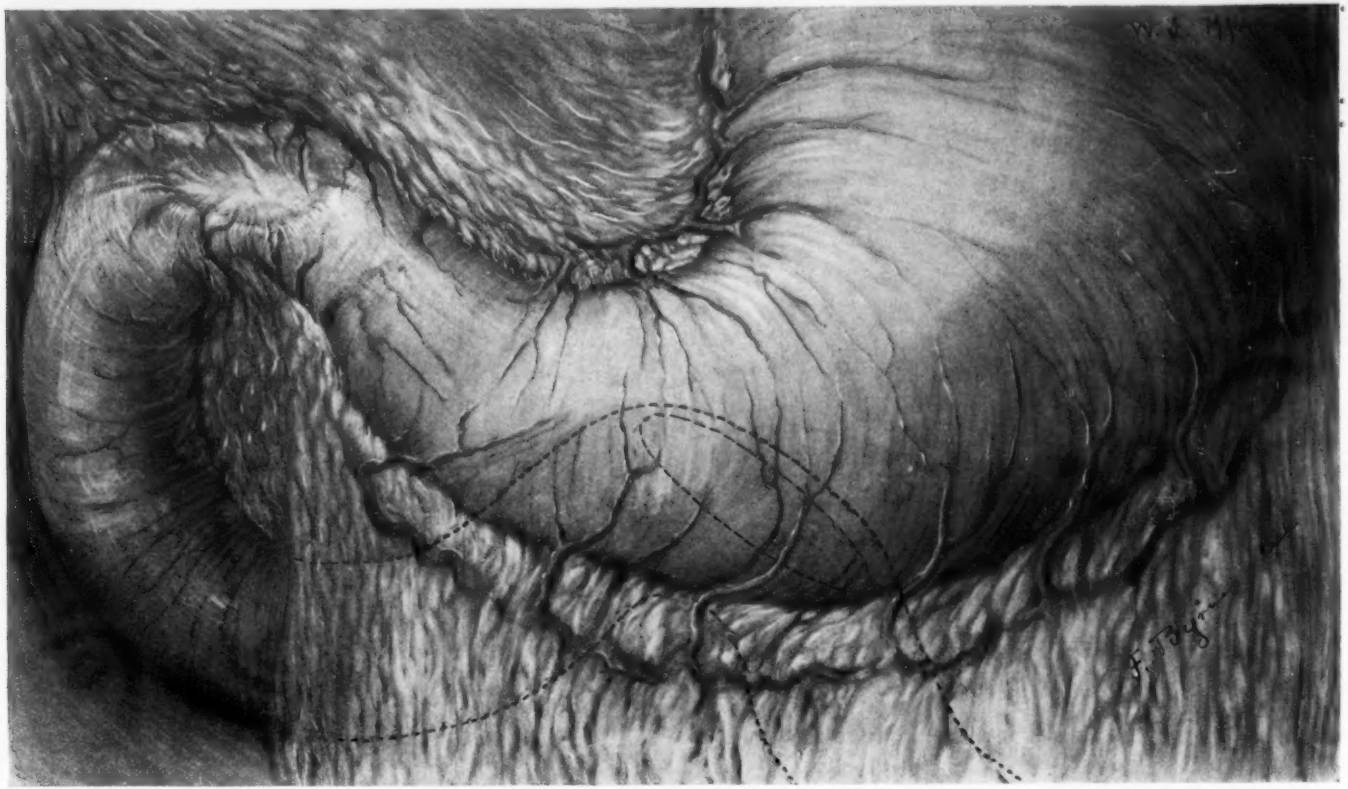
Three hundred and seventy-nine cases of gastric and duodenal ulcer were operated upon by us previous to June 1, 1906, consisting of 211 males and 168 females with an operative mortality of 4.8 per cent.

In 64 of these no ulcer was actually demonstrated at the time of operation, the record stating that they were clinical, medical, or mucous ulcers, as they were then called.

In some, slight points of apparent thickening were found, or spots where the mucous membrane did not "seem to glide on the muscular tunic as it should," and this was accepted as evidence, but in our later work actual search of the mucosa for such supposed lesions did not often show their existence.

This brings up the important question: Can *chronic* ulcer exist without visible and pronounced evidence in the walls of the stomach and duodenum? We must admit that this is a

FIG. 1.

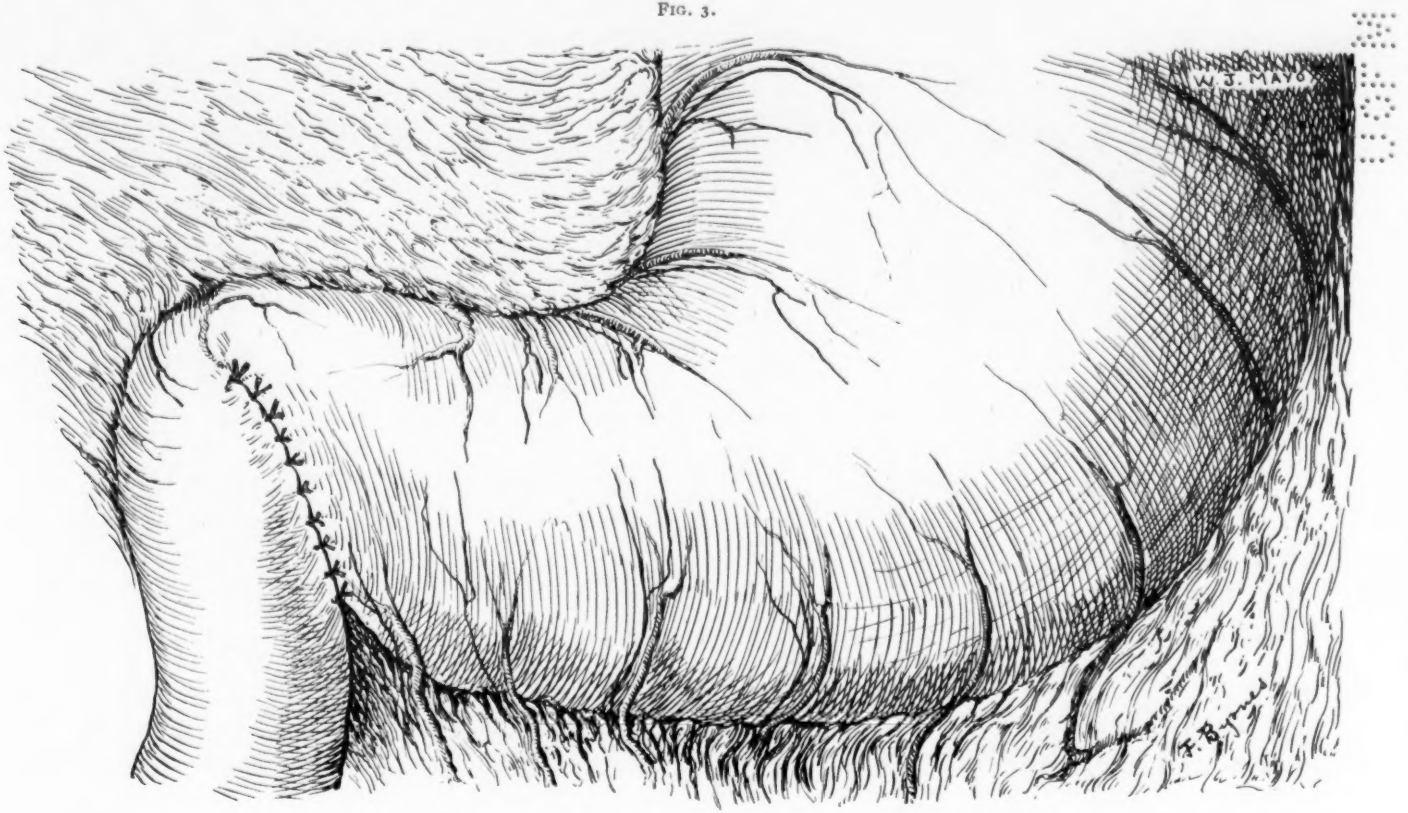


Ulcer of the duodenum and gastrojejunostomy after the posterior "no loop" method. Jejunum applied to the stomach as it normally runs, to the left and downward.

FIG 2

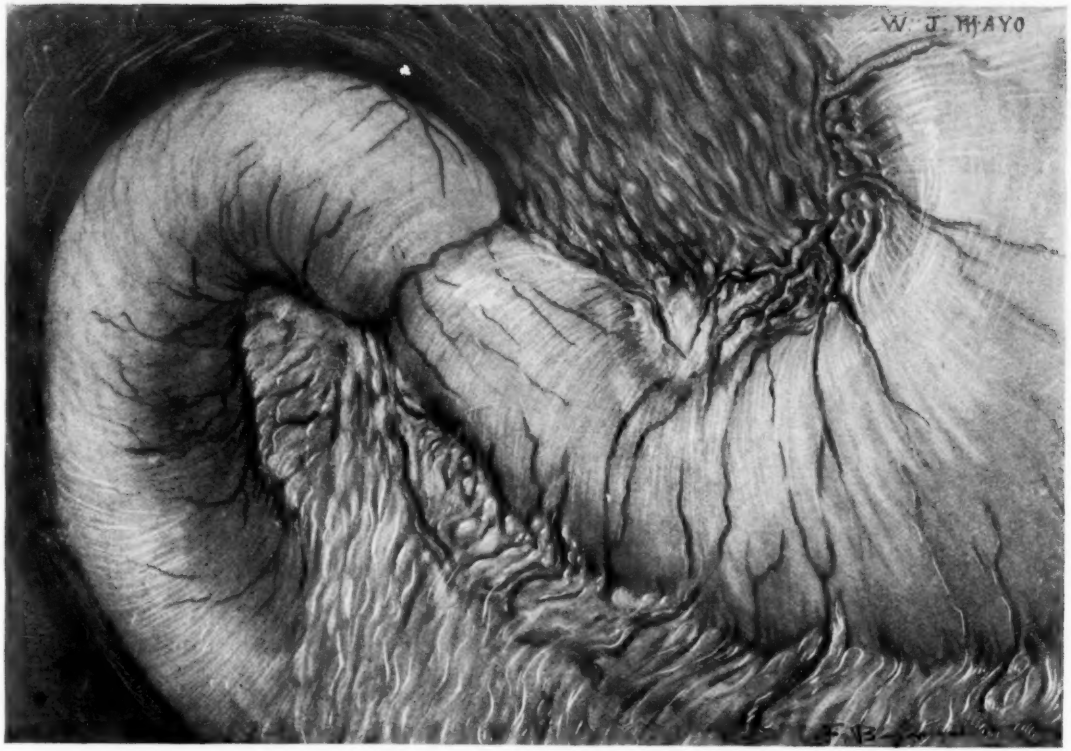
Pyloric stricture. Finney's gastroduodenostomy indicated.

FIG. 3.



Result of Finney operation. (See Fig. 2.)

FIG. 4.

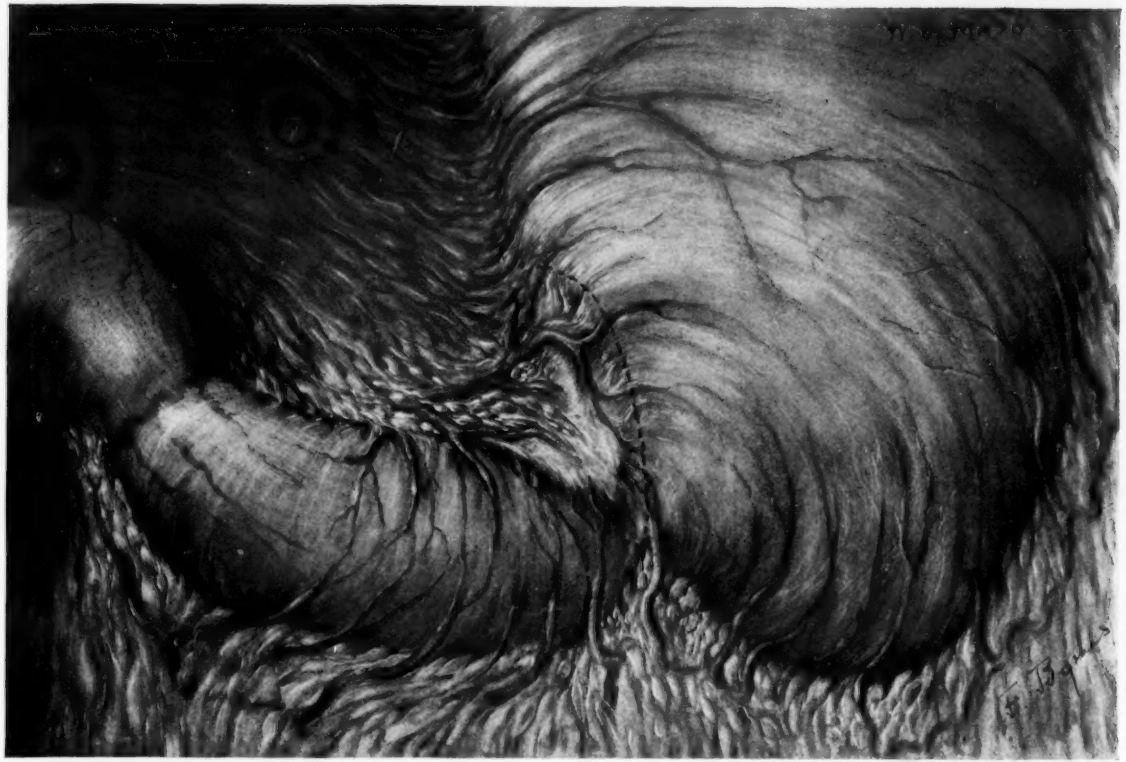


Saddle ulcer of the lesser curvature without causing serious obstruction and indicating excision. (See Fig. 5.)

FIG. 5.

Result of excision of saddle ulcer. (See Fig. 4.)

FIG. 6.



Hour-glass stomach. Dotted lines show proposed resection. (See Fig. 7.)

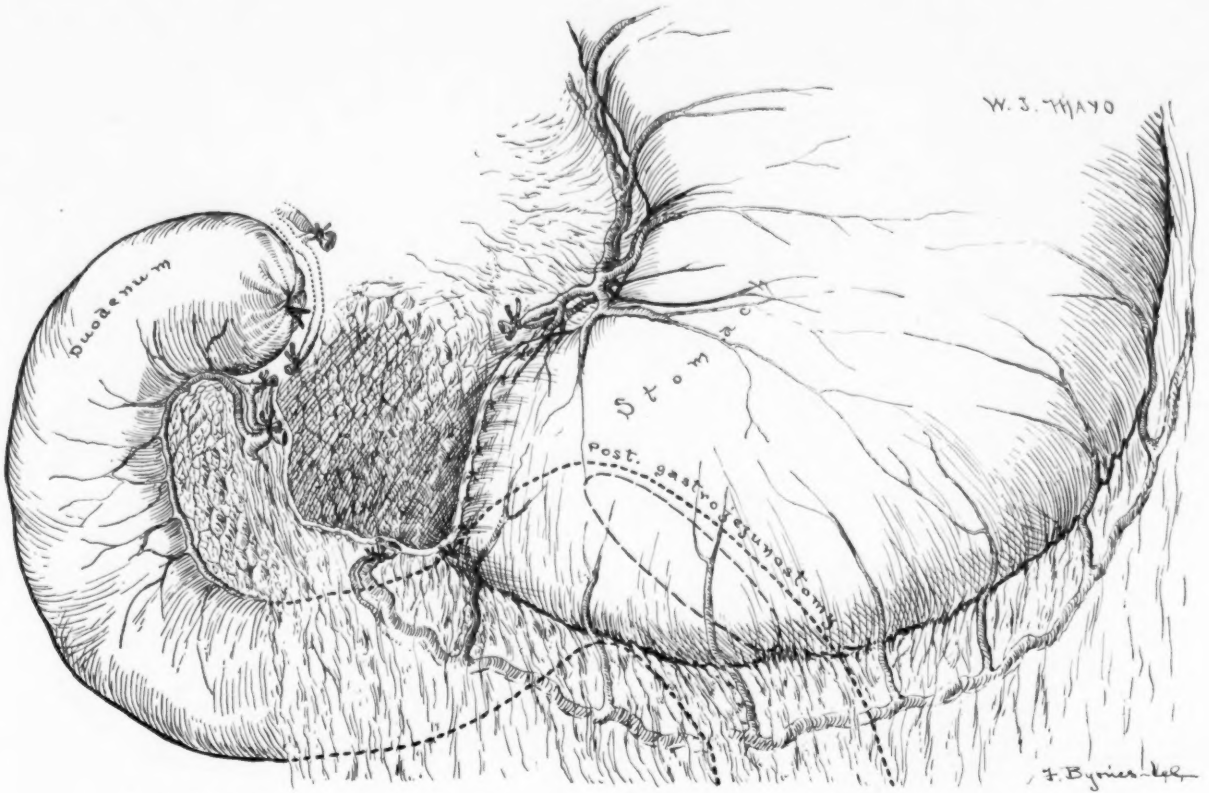
FIG. 7.

Result of resection of the obstructing ulcer in the hour-glass stomach. (See Fig. 6.)

FIG. 8.

Calloused ulcer at pyloric end of stomach. Indicating resection. (See Fig. 9.)

FIG. 9.



Result of Rodman's excision of pyloric end of stomach for calloused ulcer with gastrojejunostomy. (See Fig. 8.)

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rare possibility. We have operated upon a few cases in which we were unable to detect an ulcer even after careful intragastric investigation when the history seemed to demonstrate that an ulcer was present.

Eleven, or 17 per cent. of the 64 patients, required supplementary operations at a later date. In nine, no ulcer was discovered at the second operation, but in two an ulcer was found which had been previously overlooked. It seems fair, therefore, to put all of these 64 cases, excepting the two just mentioned in which the ulcer was shown at the second operation, in a separate classification as questionable. All of these were operated upon in the second period between 1900 and 1906. Since that time no questionable cases have been submitted to operation.

Of this questionable group we have obtained knowledge of 50. Seventeen, or 34 per cent., were cured. Fourteen, or 28 per cent., improved. Sixteen, or 32 per cent., unimproved, and, 3 or 6 per cent., are dead, showing cured and improved 62 per cent.

In the 318 cases of actually demonstrated ulcer, we have traced 234. Of these 189, or 80.7 per cent., are cured. Twenty-one, or 9 per cent., improved, 10, or 4.2 per cent., unimproved, and 14, or 6 per cent., have died since the operation from various causes; in only two cases, however, was the cause of death connected with the stomach, showing a total of 89.7 cured and improved.

In conclusion, let me say that ulcer patients need careful regulation of diet, etc., following operation, and should be under medical supervision until they have made a complete recovery.

END-RESULTS FOLLOWING OPERATION FOR BENIGN DISEASES OF THE STOMACH AND DUODENUM.*

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My being able to report the results contained in this paper has been made possible only by the careful and painstaking work of Dr. A. D. Whiting, Assistant Surgeon to the German Hospital, who collected and tabulated the data and to whom I cheerfully give the credit.

Empiricism, or the reliance on direct experience and observation rather than on theory, must be condemned, as a rule, in the scientific surgery of to-day. There should undoubtedly be a reason for every step taken in surgery; there should be a theory back of every application of practical means used to afford relief from any pathological condition found in the human body. The practical mind, however, is ever too prone to seek results rather than to explain how or why such results are obtained. Practical experience must influence us to work more or less empirically, although it must be admitted that there is always a tendency to adopt a theory which is more or less in keeping with the results obtained—a theory that may be laid aside in a day; a month, a year. This tendency toward empiricism has been especially marked in the operative treatment of some of the benign diseases of the stomach and duodenum. Practical results are obtained, but why they are obtained in some conditions must be left for the future to definitely decide. Hence it is that a study of end-results following operative interference in these diseases will give a better idea of the condition in which a stomach operation is indicated than would a study of the theoretical etiology of the

* Read before the American Surgical Association, May 4, 1908.

conditions present, or a study of the theory underlying the results obtained.

Stomach surgery is in its infancy. It has grown old enough, however, and has shown sufficient accomplishments, to make most investigators agree that certain pathological conditions to be found in that organ and the duodenum must be overcome by the surgeon rather than by the internist. The immediate results speak volumes; the end-results are far superior to any that can be obtained by other than operative means.

The principal benign diseases of the stomach and duodenum which are found in the realm of surgery to-day are ulcer, with its various complications; gastrectasis, whether due to pylorospasm, gastric myasthenia or pyloric stenosis; and stenosis of the pylorus, either with or without dilatation.

End-results following operation for gastric ulcer do not always justify the picture so graphically portrayed by Kocher, but he undoubtedly is correct in the vast majority of cases when he says that "not only can the numerous dangers of ulcerating affections of the stomach, such as hemorrhage, perforation, transition into cancer, be prevented, but the disease and its results may be so rapidly and certainly cured that the medical treatment of obscure cases must be put in the background. The pain in the stomach disappears immediately after the operation. This is the invariable rule. The patient does not require to pay any further attention to the nature of his food. The vomiting disappears, the bowels become regular, there is progressive improvement in the process of digestion."

In gastric dilatation, gastric myasthenia, and ptosis of the stomach probably the most that surgery can do is to so alter the mechanism of the stomach and intestine that medical measures will become effective.

When there is pyloric obstruction, no matter what the cause, there is a definite procedure indicated,—namely, the establishment of a free and permanent communication between the stomach and intestine.

In these various diseases, practical experience has taught that the best results may be obtained by performing a gastroenterostomy. The choice of operation varies with different operators. Personally, I prefer the posterior gastrojejunostomy, when it is practicable, the no-loop-clamp method with excision of a portion of the mucous membrane. This procedure practically eliminates the danger of the so-called "vicious circle" and the use of the clamps minimizes the danger of leakage and infection during the operation. The end-results are just as good when the suture method is used with no loop, instead of the clamps, but the primary danger is greater than in the former method. The no-loop operation is a great advance over the long-loop, not only because the immediate results are better, but also because there is much less or practically no danger of a vicious circle being established even subsequently, as not infrequently was the case even when a primary enteroenterostomy was performed.

Patient No. 2610, 1905, is a good example of this condition. Patient was a female, aged 40. She had been operated upon in 1900, the name of the operator not being ascertained, for ulcer of the stomach, a posterior gastrojejunostomy, long-loop, being performed with a Murphy button. For one year she was in good health with no stomach symptoms. During the year she gained 35 pounds. She then began vomiting intermittently, which continued with more or less regularity for three years. She was admitted to the German Hospital November 28, 1905, with persistent uncontrollable vomiting of stomach contents and bile. Operation, November 29, 1905. Ether anæsthesia. The gastrojejunostomy opening was patulous. The pylorus was partially occluded by an old scar. An enteroenterostomy with suture was performed, and the pylorus was ligated with silk. She made an uninterrupted recovery. February 11, 1908, two years and three months after the operation, she is in fairly good health, much better than before the operation, although she still complains of some stomach trouble. The no-loop operation practically eliminates all such cases from the surgeon's notice.

The operation of election should always be performed

when possible; the best possible procedure under the conditions present must be adopted when the operation of election is not feasible. A poorer and much less satisfactory method, the anterior gastrojejunostomy, should not be excluded entirely from the surgeon's list of procedures, as has been advocated by one of the best-known operators in the country.

Patient No. 478, 1902, a male aged 40 years, furnishes a good example of what can be accomplished even by this procedure. He was transferred from the medical to the surgical wards of the German Hospital with a history of long-standing stomach disease, with pyloric obstruction. A mass in the pyloric region was easily palpable. Operation, March 10, 1902. Ether anæsthesia. Upon opening the abdomen a mass the size of a lemon was found occupying the site of the pylorus and causing almost complete occlusion. Extensive adhesions made it practically impossible to deliver the stomach sufficiently to allow of a posterior operation. An interior gastrojejunostomy was performed in the belief that the patient would be benefited by it. He made a rapid and uneventful recovery, most of his symptoms disappearing immediately. Five years and eleven months after the operation he is in good health, being absolutely free from all gastric symptoms. He has gained 36 pounds.

End-results will probably always be better when it is possible to perform the operation of election or choice; but relief in all instances must be afforded the patient, if it be at all possible, whether the method used be one of choice or one of necessity.

An analysis of the end-results in operation for benign diseases of the stomach and duodenum is of great interest to the medical profession of to-day, but it will be of greater value and interest to the operator of the future when the more improved methods of operation shall have had an opportunity to show their worth with increasing age. I have been able to trace 66 of the patients upon whom I have performed stomach operations for benign disease. Of this number 44 are free from all gastric symptoms, 9 are greatly improved,

5 are unimproved, and 8 have died. These figures give a percentage of cures of 66.6; of patients that were greatly improved, 80.3. From the operative view-point these patients were divided as follows:

Posterior gastrojejunostomy, long loop, suture: 7 cases traced, 6 of whom had no gastric symptoms 5 years 7 months, 5 years 3 months, 4 years 4 months, 2 years 1 month, and 1 year 4 months, respectively, after operation. One case died 4 years and 4 months after operation from unknown cause. Percentage of cures, 85.7.

Posterior gastrojejunostomy, long loop, suture, primary enteroenterostomy with Murphy button: 12 cases traced, 7 of whom had no gastric symptoms 4 years 5 months, 4 years 4 months, 3 years 4 months, 2 years 11 months, 2 years (moved to Ireland), 2 years 6 months, 3 years 2 months, respectively, after operation. One was improved 2 years 10 months after operation. Two were unimproved 3 years and 2 years 8 months respectively, after operation. Two cases died, both 2 months after operation. Percentage of cures was 58.3, of those improved, 66.6.

Posterior gastrojejunostomy, long loop, suture, secondary enteroenterostomy, Murphy button: 3 cases traced, 1 of whom had no gastric symptoms 4 years 6 months after operation. Two cases died, one 2 years and 2 months after operation, cause unknown; the other died 1 year after operation from obstruction of the bowel due to bands. Percentage of cures was 33.33.

Posterior gastrojejunostomy, long loop, suture, primary enteroenterostomy with secondary ligation of the pylorus: 1 case traced, no gastric symptoms 2 years 2 months after operation.

Posterior gastrojejunostomy, long loop, suture, secondary gastroduodenostomy and enteroenterostomy: 1 case traced, no gastric symptoms 1 year 6 months after operation.

Posterior gastrojejunostomy, no loop, suture: 25 cases traced, of whom 16 had no gastric symptoms 2 years 7 months, 2 years 4 months, 2 years, 2 years, 2 years, 1 year 11 months,

1 year 9 months, 1 year 8 months, 1 year 8 months, 1 year 7 months, 1 year 7 months, 1 year 7 months, 1 year 5 months, 1 year 4 months, 1 year 1 month, 1 year 1 month, respectively, after operation. Four cases were improved 1 year 7 months, 1 year 5 months, 1 year 3 months, 1 year 2 months, respectively, after operation. Three cases were unimproved 2 years 2 months, 1 year 6 months, 1 year 3 months, respectively, after operation. One case died 1 year after operation, cause of death unknown. Percentage of cures, 64; of improvements, 84.

Posterior gastrojejunostomy, no loop, clamps: 6 cases traced, of whom 5 had no gastric symptoms 1 year, 11 months, 11 months, 10 months, 6 months, respectively, after operation. One case died 7 months after operation, there having been no improvement in the gastric condition.

Anterior gastrojejunostomy, suture: one case traced, no gastric symptoms 5 years 11 months after operation.

Duodenorrhaphy, posterior gastrojejunostomy, long loop, suture, primary enteroenterostomy: 1 case traced, no gastric symptoms 3 years 7 months after operation.

Duodenorrhaphy, posterior gastrojejunostomy, no loop, clamps: 1 case traced, no symptoms 9 months after operation.

Gastrogastrostomy, posterior gastrojejunostomy, short loop, suture: 1 case traced, improved 2 years 3 months after operation.

Gastrogastrostomy, posterior gastrojejunostomy, no loop, clamps: 1 case traced, improved 10 months after operation.

Enteroenterostomy, ligation of pylorus: 1 case traced, improved 2 years 3 months after operation.

Partial gastrectomy, posterior gastrojejunostomy, no loop, clamps: 1 case traced, no symptoms 8 months after operation.

Pylorectomy, posterior gastrojejunostomy: 1 case traced, no symptoms 4 years 8 months after operation.

Pyloroplasty: 1 case traced, no symptoms 4 years 7 months after operation.

Pylorectomy, posterior gastrojejunostomy, long loop,

suture, primary enteroenterostomy: 1 case traced, died 5 months after operation from general anasarca.

Gastrorrhaphy, posterior gastrojejunostomy, long loop, suture, primary enteroenterostomy: 1 case traced, no symptoms 4 years 7 months after operation.

An analysis of the various diseases of the stomach and duodenum for which operations were performed gives a good idea of the beneficial results obtained. The results presented at this time and those that will be brought before the medical world in five or ten years will vary considerably on account of the great advancement that is being constantly made in the technic of the various forms of operation advocated. The patients of the future will have the benefit of the work that has been accomplished in the past, all of which will be greatly to their advantage. It will also be established, probably, that a certain operative procedure is more fitted to the cure of one disease than to another, that each disease will be treated as an entity, with a special form of operation, whether it be a pyloroplasty, a posterior gastrojejunostomy, an excision, a pylorectomy, a partial gastrectomy, or what not.

The cases traced were diagnosed as follows: Ulcer of the stomach, 37 cases, of whom 23 were cured, 6 improved, 4 unimproved and 4 died, or 62.1 per cent. cures. Ulcer of the duodenum, 12 cases, of which 2 had perforation. Of these 12 cases 11 were cured and 1 improved, or 91.6 per cent. cures. Stenosis of pylorus, 8 cases, of which 5 were cured, or 63.5 per cent. cures. Gastrectasis, 6 cases, of which 4 were cured, or 66.6 per cent. of cures. Vicious circle and peripyloric adhesions, 1 case each, of which number neither was cured, although both were greatly improved. Neoplasm of the pylorus, 1 case, cured. Total, 66 cases traced, of which number 44, or 66.6 per cent., were cured.

The list of diseases, the operation performed, and the end-results are as follows:

Ulcer of stomach, posterior gastrojejunostomy, long loop, suture: 4 cases traced, of whom 3 had no symptoms 4 years 4 months, 1 year 4 months (when he was killed in a

mine), and 1 year 9 months, respectively. The fourth case died about 4 years after operation, cause of death not known.

Ulcer of stomach, posterior gastrojejunostomy, primary enteroenterostomy, Murphy button: 10 cases traced, of whom 6 had no stomach symptoms 4 years 4 months, 3 years 2 months (died: nephritis), 2 years 11 months, 2 years (moved to Ireland), 2 years 4 months, respectively. One case was improved 2 years 10 months after operation. One case was unimproved, 2 years 8 months after operation. Two cases died 2 months after operation, there having been no improvement in symptoms.

Ulcer of stomach, posterior gastrojejunostomy, long loop, suture, secondary enteroenterostomy, Murphy button: 1 case traced, no symptoms 4 years 6 months after operation.

Ulcer of stomach, posterior gastrojejunostomy, no loop, suture: 15 cases traced, of whom 8 had no symptoms 2 years 2 months, 2 years, 2 years, 1 year 9 months, 1 year 8 months, 1 year 5 months, 1 year 4 months, respectively, after operation. Three cases were improved, 2 years, 1 year 5 months, 1 year 2 months; 3 were unimproved, 2 years 2 months, 1 year 6 months, 1 year 3 months, and one case died (cause of death unknown) 1 year, respectively, after operation.

Ulcer of stomach, pylorectomy, posterior gastrojejunostomy, long loop, suture: 1 case traced, no symptoms 4 years 8 months after operation.

Ulcer of stomach, posterior gastrojejunostomy, long loop, suture, enteroenterostomy, Murphy button with secondary ligation of pylorus: 1 case traced, no symptoms 2 years 2 months after operation.

Ulcer of stomach, posterior gastrojejunostomy, secondary gastroduodenostomy with enteroenterostomy, Murphy button: 1 case traced, greatly improved 1 year 6 months after operation.

Ulcer of stomach with hour-glass contraction, 2 cases traced. In both cases a gastrogastrostomy with posterior gastrojejunostomy, no loop, was performed. Both cases were markedly improved, one 2 years 3 months, and the other 10 months after operation.

Ulcer of stomach, perforated, gastrorrhaphy, posterior gastrojejunostomy, long loop, suture, primary enteroenterostomy, Murphy button: 1 case traced, no symptoms 3 years 3 months after operation.

Ulcer of stomach, posterior gastrojejunostomy, no loop, clamps: 1 case traced, no symptoms 1 year after operation.

Ulcer of duodenum, posterior gastrojejunostomy, long loop, suture: 2 cases traced, both well 5 years 7 months, and 2 years 1 month, respectively, after operation.

Ulcer of duodenum, posterior gastrojejunostomy, no loop, suture: 5 cases traced, of which number 4 had no symptoms, 2 years 7 months, 1 year 11 months, 1 year 7 months, 1 year 1 month, respectively, after operation. One case was improved 1 year 3 months after operation.

Ulcer of duodenum, posterior gastrojejunostomy, no loop, clamps: 3 cases traced, no symptoms 11 months, 10 months, and 6 months, respectively, after operation.

Ulcer of duodenum, perforated, duodenorrhaphy, posterior gastrojejunostomy, long loop, suture, primary enteroenterostomy, Murphy button: 1 case traced, well 3 years 7 months after operation.

Ulcer of duodenum, perforated, duodenorrhaphy, posterior gastrojejunostomy, no loop, clamps: 1 case traced, no symptoms 9 months after operation.

Stenosis of pylorus, pyloroplasty: 1 case traced, no symptoms 4 years 7 months after operation.

Stenosis of pylorus, posterior gastrojejunostomy, long loop, suture, enteroenterostomy: 2 cases traced, 1 having no symptoms 4 years 5 months, the other being unimproved 3 years after operation.

Stenosis of pylorus, posterior gastrojejunostomy, no loop, suture: 2 cases traced, both having no symptoms 2 years 4 months, and 1 year 7 months, respectively, after operation.

Stenosis of pylorus, posterior gastrojejunostomy, long loop, suture, secondary entero-enterostomy, Murphy button: 1 case traced, died 2 years 2 months after operation, cause of death unknown.

Stenosis of pylorus, pylorectomy, posterior gastrojejunostomy, long loop, suture, primary enteroenterostomy, Murphy button: 1 case traced, died 5 months after operation from nephritis, anasarca. All stomach symptoms had disappeared.

Stenosis of pylorus, partial gastrectomy, posterior gastrojejunostomy, no loop, clamps: 1 case traced, no symptoms 8 months after operation.

Gastrectasis with ptosis, posterior gastrojejunostomy, long loop, suture: 1 case traced, no symptoms 5 years 5 months after operation.

Gastrectasis, posterior gastrojejunostomy, secondary enteroenterostomy, Murphy button: 1 case traced, died 1 year after operation from intestinal obstruction due to bands.

Gastrectasis, posterior gastrojejunostomy, no loop, suture: 2 cases traced, no symptoms 1 year 7 months, and 1 year 2 months, after operation.

Gastrectasis, posterior gastrojejunostomy, no loop, clamps: 2 cases traced, 1 having no symptoms 11 months after operation; the other having died 7 months after operation, no improvement in symptoms.

Vicious circle, enteroenterostomy, ligation of pylorus: 1 case traced, improved 2 years 3 months after operation.

Peripyloric adhesions, posterior gastrojejunostomy, no loop, suture: 1 case traced, improved 1 year 7 months after operation.

Neoplasm of pylorus, anterior gastrojejunostomy, suture: 1 case traced, no symptoms 5 years 11 months after operation.

From the foregoing analyses, I would draw the following conclusions, these naturally being influenced by the immediate dangers from the various forms of operation.

1. The operation of choice should always be performed when feasible; when not feasible, the operation of necessity should be performed.

2. All cases of stenosis of the pylorus, whether due to a neoplasm, cicatricial contraction, hyperplasia, pylorospasm, or what not, should be treated by operative interference, preferably by posterior gastrojejunostomy.

TABULATED STATEMENT SHOWING END-RESULTS FOLLOWING OPERATIONS FOR BENIGN DISEASES OF THE STOMACH AND DUODENUM

Date	Case No.	Diagnosis	Operation	End-Results
1902	478	Pyloric neoplasm, general adhesions	Ant. gastrojejunostomy, suture	Well, 5 yrs. 11 mos.
1902	1405	Ulcer duod., stenosis pylorus	Post. gastrojejunostomy, long loop, suture	Well, 5 yrs. 7 mo.
1902	1953	Ulcer stom. stenosis pylorus. Adhesions	Post. gastrojejunostomy, long loop, suture	Died, 4 yrs. cause?
1902	2257	Gastrectasis	Post. gastrojejunostomy, long loop, suture	Well, 5 yrs. 5 mos.
1903	1291	Stenosis pylorus. Cholecystitis	Pyloroplasty. Cholecystostomy	Well, 4 yrs. 7 mos.
1903	1385	Ulcer stom., stenosis pylorus	Pylorectomy, post. gastrojejunostomy, long loop, suture.	Well, 4 yrs. 8 mos.
1903	1482	Stenosis pylorus	Post. gastrojejunostomy, long loop, suture, secondary enteroenterostomy, Murphy button.	Died, 2 yrs. 2 mo.?
1903	1604	Ulcer stom. stenosis of pylorus	Post. gastrojejunostomy, long loop, suture, secondary enteroenterostomy, Murphy button.	Well, 4 yrs. 6 mos.
1903	1750	Stenosis of pylorus	Post. gastrojejunostomy, long loop, suture, enteroenterostomy, Murphy button.	Well, 4 yrs. 5 mos.
1903	2166	Ulcer stomach, cicatrix pylorus	Post. gastrojejunostomy, long loop, suture, enteroenterostomy, Murphy button.	Well, 4 yrs. 4 mos.
1903	2245	Ulcer stom., pyloric adhesions	Post. gastrojejunostomy, long loop, suture	Well, 4 yrs. 4 mos.
1904	881	Gastrectasis, gastroptosis	Post. gastrojejunostomy, long loop, suture, secondary enteroenterostomy, Murphy button.	Died, 1 yr. Intest. Obs.
1904	1359	Ulcer duodenum, perforated	Duodenorrhaphy, post. gastrojejunostomy, long loop, suture; 2nd enteroenterostomy, Murphy button.	Well 3 yrs. 7 mos.
1904	1705	Ulcer stom., stenosis pylorus	Post. gastrojejunostomy, long loop, suture, enteroenterostomy, Murphy button.	Well, 3 yrs. 4 mos.

1904	2023	Ulcer stom., perforated	Gastrorrhaphy, post. gastrojejunostomy, long loop, entero-enterostomy, Murphy button.	Well, 3 yrs. 3 mos.
1904	3080	Ulcer stom., stenosis pylorus	Post. gastrojejunostomy, long loop, suture, entero-enterostomy, Murphy button.	Died, 2 mos. exhaust.
1904	4010	Ulcer of stomach	Post. gastrojejunostomy, long loop, suture, entero-enterostomy, Murphy button.	Died, 3 yrs. 2 mos. Nephritis.
1905	137	Stenosis of pylorus due to mass	Post. gastrojejunostomy, long loop, suture, entero-enterostomy, Murphy button.	No imp. 3 yrs.
1905	293	Ulcer stom., cicatrix pylorus	Post. gastrojejunostomy, long loop, suture, entero-enterostomy, Murphy button.	Well, 2 yrs. 11 mos.
1905	560	Ulcer stom., stenosis pylorus	Post. gastrojejunostomy, long loop, suture, entero-enterostomy, Murphy button.	Died, 2 mos. exhaus.
1905	613	Ulcer stom., stenosis pylorus	Post. gastrojejunostomy, long loop, suture, entero-enterostomy, Murphy button.	Imp. 2 yrs. 11 mos.
1905	747	Stenosis pylorus	Pylorectomy, post. gastrojejunostomy, long loop, suture, enteroenterostomy, Murphy button.	Died, 5 mos. anasarca.
1905	1054	Ulcer of stomach	Post. gastrojejunostomy, long loop, suture, entero-enterostomy, Murphy button.	No imp. 2 yrs. 8 mos.
1905	1163	Ulcer stom., stenosis pylorus	Post. gastrojejunostomy, long loop, suture, entero-enterostomy, Murphy button.	Well, 2 yrs. moved to Ireland.
1905	1381	Ulcer duodenum, induration	Post. gastrojejunostomy, no loop, suture	Well, 2 yrs. 7 mos.
1905	1494	Ulcer stom., stenosis pylorus, adhesions to liver	Post. gastrojejunostomy, long loop, suture, entero-enterostomy, Murphy button; secondary ligation of pylorus.	Well, 2 yrs. 2 mos.
1905	1927	Stenosis of pylorus	Post. gastrojejunostomy, no loop, suture	Well, 2 yrs. 4 mos.
1905	1986	Ulcer stom. stenosis pylorus	Post. gastrojejunostomy, long loop, suture, entero-enterostomy, Murphy button.	Well, 2 yrs. 4 mos.
1905	2196	Ulcer stomach	Post. gastrojejunostomy, long loop, suture	Well, 1 yr. 4 mos., killed in mine.

TABULATED STATEMENT SHOWING END-RESULTS FOLLOWING OPERATIONS FOR BENIGN DISEASES OF THE STOMACH AND DUODENUM—*Continued*

Date	Case No.	Diagnosis	Operation	End-Results
1905	2289	Ulcer stomach, stenosis pylorus	Post. gastrojejunostomy, no loop, suture	Well, 2 yrs. 2 mos.
1905	2491	Ulcer stom., stenosis pylorus	Post. gastrojejunostomy, no loop, suture	No imp. 2 yrs. 2 mos.
1905	2595	Ulcer stom., hour-glass contraction	Gastrogastrorrhaphy, post. gastrojejunostomy, no loop, suture.	Imp. 2 yrs. 2 mos.
1905	2610	"Vicious circle" pylorus occluded by old cicatrix	Enteroenterostomy, Murphy button. Ligation pylorus	Imp. 2 yrs. 3 mos.
1905	2621	Ulcer duod., stenosis pylorus	Post. gastrojejunostomy, no loop, suture	Well, 2 yrs. 1 mo.
1905	2697	Ulcer of stomach	Post. gastrojejunostromy, long loop, suture. Secondary gastroduodenostomy, enteroenterostomy, Murphy button.	Imp. 1 yr. 6 mos.
1905	2726	Ulcer stom., cicatrix pylorus	Post. gastrojejunostomy, no loop, suture	Died, 1 yr. Cause?
1906	178	Erosion of Dieulafoy	Post. gastrojejunostomy, no loop, suture	Well, 2 yrs.
1906	204	Erosion of Dieulafoy	Post. gastrojejunostomy, no loop, suture	Imp. 2 yrs.
1906	280	Ulcer of stom., stenosis of pylorus	Post. gastrojejunostomy, no loop, suture	Well, 2 yrs.
1906	437	Ulcer duodenum, stenosis pylorus	Post. gastrojejunostomy, no loop, suture	Well, 1 yr. 11 mos.
1906	939	Ulcer of stom., cicatrix of pylorus	Post. gastrojejunostomy, no loop, suture	Well, 1 yr. 9 mos.
1906	1234	Ulcer of stomach	Post. gastrojejunostomy, long loop, suture	Well, 1 yr. 9 mos.
1906	1319	Ulcer stom., cicatrix duodenum, adhesions stomach and liver.	Post. gastrojejunostomy, no loop, suture	Well, 1 yr. 8 mos.
1906	1407	Gastrectasis	Post. gastrojejunostomy, no loop, suture	Well, 1 yr. 8 mos.
1906	1408	Ulcer stom., stenosis pylorus	Post. gastrojejunostomy, no loop, suture	Well, 1 yr. 8 mos.
1906	1413	Ulcer of duodenum	Post. gastrojejunostomy, no loop, suture	Well, 1 yr. 7 mos.
1906	1427	Stenosis of pylorus	Post. gastrojejunostomy, no loop, suture	Well, 1 yr. 7 mos.

1906	1462	Obstruction of pylorus by adhesions	Post. gastrojejunostomy, no loop, suture	Imp. 1 yr. 7 mos.
1906	1609	Ulcer stom., with gastrectasis	Post. gastrojejunostomy, no loop, suture	No imp. 1 yr. 6 mos.
1906	1942	Erosion of Dieulafoy	Post. gastrojejunostomy, no loop, suture	Imp. 1 yr. 5 mos.
1906	2035	Ulcer stom., gastrectasis with ptosis	Post. gastrojejunostomy, no loop, suture	Well, 1 yr. 5 mos.
1906	2226	Ulcer of stomach	Post. gastrojejunostomy, no loop, suture	Well, 1 yr. 4 mos.
1906	2288	Ulcer of duodenum	Post. gastrojejunostomy, no loop, suture	Imp. 1 yr. 3 mos.
1906	2545	Gastrectasis	Post. gastrojejunostomy, no loop, suture	Well, 1 yr. 2 mos.
1906	2611	Erosion of Dieulafoy	Post. gastrojejunostomy, no loop, suture	No imp. 1 yr. 2 mos.
1906	2726	Ulcer stom., with stenosis pylorus	Post. gastrojejunostomy, no loop, suture	Imp. 1 yr. 2 mos.
1906	2976	Ulcer duodenum adhesions	Post. gastrojejunostomy, no loop, suture	Well, 1 yr. 1 mo.
1907	180	Ulcer stomach	Post. gastrojejunostomy, no loop, clamps	Well, 1 yr.
1907	329	Ulcer of duodenum, cicatricial contraction	Post. gastrojejunostomy, no loop, clamps	Well, 11 mos.
1907	570	Gastrectasis	Post. gastrojejunostomy, no loop, clamps	Well, 11 mos.
1907	805	Ulcer stomach, hour-glass contraction	Gastrogastrostomy, post. gastrojejunostomy, no loop, clamps.	Well, 10 mos.
1907	921	Ulcer of duodenum	Post. gastrojejunostomy, no loop, clamps	Well, 10 mos.
1907	1060	Ulcer of duodenum, perforated	Duodenorrhaphy, post. gastrojejunostomy, no loop, clamps.	Well, 9 mos.
1907	1236	Stenosis pylorus, adhesions to liver	Partial gastrectomy, post. gastrojejunostomy, no loop, clamps.	Well, 8 mos.
1907	1606	Gastrectasis	Post. gastrojejunostomy, no loop, clamps	Died, 7 mos. No imp.
1907	1737	Ulcer of duodenum	Post. gastrojejunostomy, no loop, clamps	Well, 6 mos.

3. All cases of ulcer of the stomach which do not respond to medical treatment promptly, and the various sequelæ of this disease, should be treated by operation.

4. All cases of ulcer of the duodenum, which do not respond promptly to medical treatment, should be treated by operation.

5. My preference in performing gastroenterostomy is by the posterior gastrojejunostomy, no loop, clamp route.

A list of the cases traced, in more or less detail, follows:

ABSTRACTS OF CASE HISTORIES.

I. Patient 478, 1902.—Transferred from medical to surgical wards with history of long-standing stomach trouble due to pyloric obstruction. Oper. 3–10–'02.—Ether anæsthesia. Stomach slightly enlarged. Mass size of lemon occupying seat of pylorus. Adhesions of long standing prevented posterior gastrojejunostomy. Anterior gastrojejunostomy performed, with sutures. Recovery. February 5, 1908.—No symptoms. Is in very good health. Gained 36 pounds.

II. Patient 1405, 1902.—Female aged 38. For 15 years had had indigestion, pains in epigastric region, nausea. No mass palpable. Oper. 7–27–'02.—Ulcer of duodenum with cicatricial stenosis of pylorus. Posterior gastrojejunostomy, long loop, suture. February 9, 1908.—No symptoms except constipation. In good health. Has gained in weight.

III. Patient 1953, 1902.—Female aged 27. For six months had pain after eating, with vomiting half hour after meals. Pains marked in epigastrium. Eructations of gas. No blood in vomitus. Oper. 10–11–'02.—Ether anæsthesia. Ulcer of stomach, with adhesions between stomach and liver; pylorus thickened and indurated. Posterior gastrojejunostomy, long loop, suture. Patient died four years after operation, cause of death unknown.

IV. Patient 2257, 1902.—Male aged 29. Very irregular in regard to meals. For six years has had epigastric pains, generally worse at night, oftentimes when asleep. Would awaken to find stomach greatly distended and painful. Eructations of gas gave relief. For last six weeks has had vomiting attacks, vomitus consisting of partly digested food. No blood. Lost 20 pounds in six weeks. Oper. 11–19–'02.—Lesser curvature of stomach

on level with umbilicus, greater curvature 5 inches below. Posterior gastrojejunostomy, long loop, suture. February 4, 1908.—No symptoms. In good health. Has gained 66 pounds.

V. Patient 1291, 1903.—Male, aged 45. For 8 years had suffered from stomach trouble with marked constipation. Tenderness last year over gall-bladder region. Oper. 6–11–'03.—Chronic cholecystitis. Pylorus thickened and contracted. No scars discernible. Cholecystostomy. Pyloroplasty. January 27, 1908.—Slight soreness over gall-bladder. No stomach symptoms. Health good. Has gained in weight.

VI. Patient 1385, 1903.—Female, aged 48. Subject to stomach and liver troubles for last 10 years. Attacks would recur at intervals of about 10 months, lasting 2 to 3 weeks. Ten months ago had severe attack with coffee-ground vomitus, which was very acid. Abdomen distended, some tenderness in epigastric region. Oper. 6–24–'03.—Ulcer of stomach with stenosis of pylorus. Pylorectomy, posterior gastrojejunostomy, long loop, suture. Pathological diagnosis.—Hyperplasia of submucous and muscular coats, extensive round-celled infiltration. February 3, 1908.—No symptoms. In fine health. Has gained normal weight.

VII. Patient 1482, 1903.—Female, aged 24. For three years had fulness and distress after eating. For two years became nauseated after eating, with vomiting. No blood in vomitus nor stools. Steady dull pain, burning in character just above umbilicus. Not relieved by eating. Oper. 7–23–'03.—Numerous adhesions around neck of gall-bladder and duodenum. Stomach slightly enlarged, in rather low position, pyloric opening thickened and lumen narrowed. Posterior gastrojejunostomy, long loop, suture. Persistent vomiting after operation. Second Oper. 7–18–'03.—Anastomosis in good condition. Enteroenterostomy, Murphy button. Patient died in September, 1905, cause of death not known.

VIII. Patient 1604, 1903.—Male, aged 32. For 12 years had stomach trouble. About once yearly would have attacks of pain in epigastrium, with soreness and vomiting. Pain relieved by taking food. Attacks lasted 3 to 4 weeks. Ten days had severe attack, pains in epigastrium and over gall-bladder, referred to shoulders. Vomiting, but no blood in vomitus at any time. Oper. 7–23–'03.—Stomach increased in size, greater curvature

about 2 inches below umbilicus. Adhesions of pyloric end of stomach to gall-bladder. Cicatrix of ulcer. Posterior gastrojejunostomy, long loop, suture. Persistent vomiting after operation. Second Oper. 8–3–'03.—Anastomosis in good condition. Enteroenterostomy, Murphy button. January 28, 1908.—No symptoms. In good health. Gained 34 pounds.

IX. Patient 1750, 1903.—Male, aged 41. Had enteric fever 18 years ago, followed by "stomach trouble," which has persisted. Last two years could not eat much solid food. Last three months has lost 20 pounds. Oper. 8–15–'03.—Stenosis of pylorus. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. January 27, 1908.—No symptoms. In good health. Has gained 44 pounds.

X. Patient 2166, 1903.—Female, aged 47. "Indigestion" last 20 years. Pneumonia 10 years ago; enteric fever 9 years ago. Two years ago had sudden attack of dull pain in epigastrium which increased in severity and extended over entire abdomen. Pains relieved by vomiting, the vomitus being at times blood streaked. Stools very dark during attacks of pain. Oper. 10–14–'03.—Ulcer of stomach with cicatricial mass near pylorus. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. February 11, 1908.—No stomach symptoms. In good health, except is rheumatic.

XI. Patient 2245, 1903.—Had "indigestion" at irregular intervals for 15 years. Fifteen months ago had sharp epigastric pains which radiated to back. Has had but one attack of hematemesis. Nausea and vomiting of undigested food about half hour after meals. Oper. 10–24–'03.—Stomach dilated, extending below umbilicus; cicatrix from ulcer, with adhesions, near pylorus. Posterior gastrojejunostomy, long loop, suture. February 3, 1908.—No symptoms. "Not better in years." Has gained 35 pounds.

XII. Patient 881, 1904.—Female, aged 46. Erysipelas of face recurring from age of 8 once or twice yearly for years. Had three large pulmonary hemorrhages at short intervals, 20 years ago. Had "indigestion" last 13 years. Eructations, hiccoughs, gastric distress with pain after eating. No vomiting. Has been on milk diet for weeks at a time. Oper. 5–14–'04.—General lengthening of the mesentery of the bowel, with ptosis of stomach and intestine. Stomach was very much dilated. Posterior gas-

trojejunostomy, long loop, suture. Persistent vomiting after operation. Second operation 5–31–'04.—Anastomosis in good condition. Enteroenterostomy, Murphy button. Re-admitted to German Hospital 5–21–'05 in a very weak condition, abdomen markedly distended, constant vomiting. Condition had lasted three days. Oper. 5–21–'05.—Omentum adherent to parietal peritoneum. Obstruction of bowel by bands, with volvulus of mesentery. Obstruction relieved. Patient died on the table.

XIII. Patient 1359, 1904.—Male, aged 32. For 9 years had been a sufferer from epigastric pains, nausea and constipation. Could not vomit. Day before admission had excruciating pains, worse in right hypochondrium. Oper. 7–3–'04.—Perforated ulcer of duodenum. Ulcer 3 mm. in diameter. Ulcer closed with silk Lembert suture. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. February 1, 1908.—No symptoms. In fine condition.

XIV. Patient 1705, 1904.—Male, aged 48. Had first attack of "stomach trouble" 19 years ago, lasting 2 weeks. Loss of appetite, vomiting, constipation, pains in epigastrium. Six years later had similar attack lasting several weeks. In last four or five years attacks have become more frequent. Pain usually relieved by phosphate of soda. Has been under treatment for years. Oper. 9–9–'04.—Ulcer of stomach with cicatricial contraction near pylorus. Posterior gastrojejunostomy, long loop, suture, enteroenterostomy, Murphy button. January 26, 1908.—No symptoms. In fine health.

XV. Patient 2023, 1904.—Had had "indigestion" for years. Admitted to hospital with history of sudden attack of pain in epigastrium, followed by sweating, collapse. Abdomen distended and tender. Oper. 10–24–'04.—Ulcer of stomach, perforated. Ulcer closed with silk Lembert suture. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. January 30, 1908.—Has no symptoms, no suffering, but complains of lack of strength.

XVI. Patient 2080, 1904.—Male, aged 30. Was operated upon about 2 months before admission, for mastoid disease (at another hospital). Five weeks before admission had sharp pain after eating solids, pains lasting about 10 minutes. Gradually increased in severity so that he could take nothing but liquids. Continuous nausea after eating, but no vomiting. Oper. 11–17–

'04.—Stomach walls thicker than normal near pylorus, and pyloric opening constricted. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy. Patient died about 1–1–'05 there having been no improvement in his symptoms. Died from inanition and exhaustion.

XVII. Patient 4010, 1904.—Male, aged 24. Had had "indigestion" for years. Eructations of gas, marked pain after eating, nausea and vomiting. At times blood in vomitus. Oper. 11–23–'04.—Ulcer of stomach. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. Patient died in January, 1908, from nephritis. Had had no stomach symptoms after operation.

XVIII. Patient 137, 1905.—Male, aged 37. For 7 years had gastric distress, worse after eating, constipation, loss of weight. Vomiting at long intervals. Mass palpable to left of umbilicus. Oper. 1–21–'05.—Pylorus thickened, lumen contracted. No other lesion found in stomach or intestine. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. January 31, 1908.—At times has same symptoms as before operation. Under medical treatment. Health poor. No natural bowel movements.

XIX. Patient 293, 1905.—Male, aged 31. For 8 years had gastric cramps. No vomiting until 4 years ago. Constant dull, aching pain in epigastrium, worse at night. Vomiting. Oper. 2–9–'05.—Ulcer of stomach with cicatrix near pylorus. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. January 24, 1908.—No symptoms. In good health. Gained in weight.

XX. Patient 560, 1905.—Male, aged 24. For years had had "stomach trouble." Last 8 months had cramp-like pains in stomach, worse at night, aggravated by eating. Constant pain during last month. Oper. 3–23–'05.—Ulcer of stomach with cicatricial stenosis of pylorus. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. Patient died about two months after operation. Had had persistently blood stools. Death probably due to exhaustion and inanition.

XXI. Patient 618, 1905.—Male, aged 38. Indefinite history of "stomach trouble" extending over years. During last year had marked pains in stomach, worse at night. Solid food vomited 24 hours after ingestion. Oper. 3–23–'05.—Ulcer of stomach

near pylorus, with stenosis of pylorus. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. January 24, 1908.—Much better than before operation. Health fair. Has gained in weight.

XXII. Patient 747, 1905.—Female, aged 65. For 7 years had pains in epigastrium after eating, vomiting two or three hours after meals. No hematemesis. Oper. 4–7–'05.—Stenosis of pylorus. Pylorectomy; posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. Pathological Report.—Fibrous thickening of submucous and muscular coats. Patient died about 5 months after operation, having developed general anasarca; urine very scanty. Marked ascites.

XXIII. Patient 1054, 1905.—Female, aged 29. For 8 years had suffered from chlorosis. Had anorexia, vomiting, hematemesis, pain in stomach after eating. Oper. 5–20–'05.—Ulcer of stomach. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. January 28, 1908.—Attacks similar to those before operation persisted. Went to Scotland and entered Victoria Infirmary, Glasgow. Exploratory operation performed, everything found all right. Abdomen closed. Never free from suffering. Health same as before operation.

XXIV. Patient 1163, 1905.—Female, aged 24. For 4 years had gastric pains with vomiting 2 hours after meals. Pain, burning in character. Oper. 6–10–'05.—Ulcer of stomach with cicatrix near pylorus. Posterior gastrojejunostomy, long loop, suture; enterenterostomy, Murphy button. Patient moved to Ireland in June, 1907, in fine health.

XXV. Patient 1381, 1905.—Male, aged 35. For 5 weeks had dull epigastric pains, about 2 hours after meals. No vomiting. Constipated. Lost 30 pounds. Oper. 6–29–'05.—Ulcer of duodenum, with induration. Posterior gastrojejunostomy, short loop, suture. January 24, 1908.—No symptoms. In splendid health. Gained 20 pounds.

XXVI. Patient 1494, 1905.—Male, aged 31. For 2 years had abdominal pains, vomiting after eating with relief. Malena. Oper. 7–14–'05.—Ulcer of stomach, stenosis of pylorus with adhesions to liver. Posterior gastrojejunostomy, long loop, suture; enteroenterostomy, Murphy button. Pains continued after operation, persistent vomiting. Second Oper. 11–2–'05.—Anastomoses in good condition. Adhesions between pylorus and ab-

dominal wall. Pylorus ligated with silk. February 11, 1908.—No symptoms. In splendid health. Gained in weight.

XXVII. Patient 1927, 1905.—Female, aged 28. Nine years ago had operation for appendicitis with secondary abscesses. Last two years has had "stomach trouble," great pain in epigastrium with vomiting. Oper. 9–17–'05.—Circular thickening of pylorus. No scars. Posterior gastrojejunostomy, no loop, suture. January 30, 1908.—No symptoms. Free from all suffering one year after operation. Has gained in weight.

XXVIII. Patient 1986, 1905.—Female, aged 30. For 10 years has had dull, boring pains in epigastrium, vomiting. Hematemesis. Oper. 9–14–'05.—Ulcer of stomach with stenosis of pylorus. Posterior gastrojejunostomy, long loop, suture; entero-enterostomy, Murphy button. January 29, 1908.—No symptoms. Health very good.

XXIX. Patient 2196, 1905.—Male, aged 23. Oper. 10–12–'05.—Ulcer of stomach. Posterior gastrojejunostomy, long loop, suture. Patient was in good health, with no stomach symptoms November 11, 1906, when he was hurt while following his occupation of miner, from which injuries he died three days later.

XXX. Patient 2467, 1905.—Male, aged 53. Had "stomach trouble" for 30 years. Had ulcer of stomach, for which a pyloroplasty had been performed in another hospital 5 years ago. Was well until 1 year ago, when he had epigastric pains, with vomiting after meals, pains worse at night. Oper. 11–11–'05.—Pylorus markedly indurated. Posterior gastrojejunostomy, no loop, suture. January 23, 1908.—No symptoms. Health "could not be better." Gained 20 pounds.

XXXI. Patient 2491, 1905.—Male, aged 20. For 2 years had had epigastric pains, dull and heavy, after eating. Eructations of gas, nausea but no vomiting. Constipated. Oper. 11–18–'05.—Ulcer of stomach with stenosis of pylorus. Posterior gastrojejunostomy, no loop, suture. January 29, 1908.—About same as before operation. Has distress and pain after eating. "Sour stomach," and constipation.

XXXII. Patient 2595, 1905.—Female, aged 24. For 3 years had epigastric pains after eating. Nausea but no vomiting. Oper. 11–28–'05.—Ulcer of stomach with hour-glass contraction. Stomach incised longitudinally and sutured transversely. Posterior gastrojejunostomy, no loop, suture. February 18, 1908.—

Symptoms improved. During pregnancy had no symptoms, and was perfectly well. Since child-birth, symptoms have returned but is better than before operation.

XXXIII. Patient 2610, 1905.—Had been operated upon in 1900, at another hospital, for ulcer, posterior gastrojejunostomy, Murphy button, having been performed. For 1 year was in good health; gained 35 pounds. Symptoms returned, vomiting, with pain in epigastrium. Oper. 11–29–'05.—Gastrojejunostomy opening patulous but small. Pylorus occluded by old scar, partially. Enteroenterostomy, Murphy button. Ligation of pylorus, silk. February 11, 1908.—Better than before operation, but has attacks of vomiting, the vomitus being bitter and very sour. Has gained in weight.

XXXIV. Patient 2621, 1905.—Male, aged 44. As far back as patient can remember he has had dull pain localized at point midway between ensiform and umbilicus. Pain relieved by eating, returns about 2 hours after meals. No hematemesis. Has noticed blood streaks in stools. Lavage of stomach during past year. Slight relief. Oper. 12–2–'05.—Ulcer of duodenum with thickening and constriction of pylorus. Posterior gastrojejunostomy, no loop, suture. January 23, 1908.—No symptoms. In very good health.

XXXV. Patient 2683, 1905.—Female, aged 29. Oper. 12–11–'05.—Ulcer of stomach. Posterior gastrojejunostomy, long loop, suture. Readmitted to hospital 4–6–'06, vomiting more or less constant since last operation. Second Operation 5–19–'06.—Anastomosis in good condition. Pylorus occluded. Gastroduodenostomy, suture; enteroenterostomy, Murphy button. January 27, 1908.—Some improvement. Health not good. Sick from time to time.

XXXVI. Patient 2726, 1905.—Male, aged 28. For 6 years had "indigestion," epigastric pains, irregular vomiting. Loss of weight and strength. Oper. 12–16–'05.—Ulcer of stomach with cicatrix near pylorus. Posterior gastrojejunostomy, no loop, suture. Patient died 12–14–'06, cause of death not known.

XXXVII. Patient 178, 1906.—Male, aged 41. No serious illness in adult life except pain over gall-bladder. Had exploratory cholecystotomy performed (in a southern city), no calculi found. Wound closed without drainage of gall-bladder. Had continued pain along right costal margin, dull and steady, at

times referred to back. Never vomits, but is nauseated. Oper. 1–11–'06.—Stomach enlarged, marked adhesions between pylorus and liver. On incision into stomach, mucous membrane found hemorrhagic. Posteric gastrojejunostomy, no loop, suture. January 10, 1908.—No symptoms. "Never in better health in my life."

XXXVIII. Patient 204, 1906.—Male, aged 34. Two months before admission had violent attack of diarrhœa, lasting 4 days, followed by constipation which has persisted. Vomits at irregular intervals. Oper. 1–31–'06.—Mucous membrane of stomach very hemorrhagic. Slight adhesions between pylorus and liver. Posterior gastrojejunostomy, no loop, suture. January 8, 1908.—Better than before operation, but not well. Gained in weight.

XXXIX. Patient 280, 1906.—Female, aged 57. Not well during last 8 months. About 4 weeks before admission had sudden attack of pain in epigastrium with vomiting. Has been unable to eat solid food since that time. Vomiting begins about 1 hour after meals. Oper. 2–3–'06.—Stomach dilated, ptosed, veins distended over greater part of surface. Pylorus opaque, thickened and nodular. Mucous membrane of stomach markedly hemorrhagic. Posterior gastrojejunostomy, no loop, suture. February 8, 1908.—Patient in good health. No symptoms.

XL. Patient 437, 1906.—Male, aged 41. For 24 years had had "indigestion," accompanied irregularly with epigastric pains and vomiting. Oper. 2–21–'06.—Ulcer of duodenum with cicatrix. Posterior gastrojejunostomy, no loop, suture. January 15, 1908.—No symptoms since operation. Health very good. Gained 30 pounds.

XLI. Patient 939, 1906.—Female, aged 18. For 4 years had discomfort in epigastrium, distress after eating, with vomiting. No hematemesis. Tenderness over stomach. Oper. 4–21–'06.—Ulcer of stomach with cicatrix near pylorus. Posterior gastrojejunostomy, no loop, suture. January 20, 1908.—No symptoms. "General health very good." Gained in weight.

XLII. Patient 1234, 1906.—Male, aged 48. Enteric fever at 15; malaria at 38. For past 3 years had "stomach trouble," fulness of stomach with eructations. Pains in epigastrium with vomiting. Lost 27 pounds. Oper. 5–23–'06.—Ulcer of stomach. Posterior gastrojejunostomy, long loop, suture. February 21,

1908.—No symptoms. In very good health. Has gained 15 pounds.

XLIII. Patient 1309, 1906.—Male, aged 36. For 2 years had epigastric pains, made worse by eating. Nausea and vomiting. No hematemesis. Oper. 6–2–'06.—Ulcer of stomach, cicatricial contraction of pylorus, adhesions between stomach and liver. Posterior gastrojejunostomy, no loop, suture. February 21, 1908.—No symptoms. In good health. Gain in weight.

XLIV. Patient 1408, 1906.—Male, aged 40. For 3 years abdominal and epigastric pains, cramp-like, not affected by eating. Pain followed by vomiting. Oper. 6–13–'06.—Ulcer of stomach with induration near pylorus. Posterior gastrojejunostomy, no loop, suture. February 22, 1908.—No symptoms. Gain in weight.

XLV. Patient 1407, 1906.—Female, aged 38. For 2 months had headaches, epigastric pains, neausea, vomiting. Distress in epigastrium immediately after eating. Vomitus at times blood tinged. Some pain in stomach most of the time. Oper. 6–18–'06.—Stomach very much dilated, vessels engorged, serosa congested, slight if any stenosis of pylorus. Posterior gastrojejunostomy, short loop, suture. January 9, 1908.—No symptoms. Health good. Normal weight.

XLVI. Patient 1413, 1906.—Female, aged 18. For 1 year had epigastric pains, lately becoming very sharp and severe, with vomiting. No hematemesis. Oper. 6–14–'06.—Ulcer of duodenum. Posterior gastrojejunostomy, no loop, suture. January 24, 1908.—Symptoms for which operation was performed have all disappeared, although patient is not very strong.

XLVII. Patient 1427, 1906.—Male, aged 46. Has been sick for years. Uncontrollable vomiting, no blood in vomitus. Veins of abdomen very prominent. Oper. 6–13–'06.—Stomach walls thickened, congested. Pylorus thickened, lumen narrowed. Posterior gastrojejunostomy, no loop, suture. January 15, 1908.—No symptoms. Health "unusually good." Gained in weight.

XLVIII. Patient 1462, 1906.—Female, aged 40. Operated upon 10 years ago in southern city for cholelithiasis, calculi removed, gall-bladder drained. Six years later had biliary fistula for 3 days. One year later had attack of biliary colic. Bulging of scar, lanced by physician, fecal matter and pus released.

Sinus discharging at time of admission to German Hospital. Oper. 6–23–'06.—Adhesions between cicatrix and omentum, bowel, gall-bladder and pylorus. Adhesions so dense around pylorus that function was impaired. Stomach slightly dilated. Posterior gastrojejunostomy, no loop, suture. January 26, 1908.—is better than before stomach operation, but is not well. Has had pains similar to former attacks. Vomits bile at irregular intervals.

XLIX. Patient 1609, 1906.—Female, aged 18. Exploratory coliotomy performed in 1904. Stomach found slighted dilated, pylorus patulous. No pathological lesions found. In February, 1905, was treated in medical wards for "stomach trouble." Had dull, heavy pains, suffocating in character, in epigastrium, worse after eating, with nausea and feeling of extreme weakness. Had to induce vomiting, after which pains were relieved. Notice bright red blood in vomitus lately. Operation.—Stomach slightly dilated, walls congested, veins engorged. Small patch of fibrous tissue (cicatricial?) at pylorus. Omentum adherent. Incision into stomach revealed clot of blood. Posterior gastrojejunostomy, no loop, suture. January 7, 1908.—No relief. "Life a burden." Always miserable. Lost 20 pounds.

L. Patient 1942, 1906.—Female, aged 49. Had "inflammation of bowels" 20 years ago. Six months ago after heavy cold, noticed distress after eating. Anorexia. No vomiting but nausea. No sharp pains. Dull pain in epigastrium between meals. Losing weight rapidly. Marked tenderness and some rigidity in epigastrium. Oper. 8–29–'06.—Walls of stomach thickened, veins prominent, and enlarged. No pyloric obstruction, no scars. Gall-bladder and duodenum apparently normal. Incision into stomach showed mucous membrane highly congested. A quantity of fresh blood found in stomach. Posterior gastrojejunostomy, no loop, suture. January 9, 1908.—Much better than before operation. Stomach troublesome at times. Health fair. Same weight.

LI. Patient 2035, 1906.—Female, aged 36. Since childhood has had "stomach trouble," with irregular attacks of nausea, and vomiting associated with severe headaches. For last year had pains immediately after eating, with full, bloated feeling. Vomiting has been more or less constant, beginning immediately after meals. At times is blood tinged. Has vomited

bright red blood. Pain relieved by vomiting. Oper. 8–27–'06.—Ulcer of stomach, with gastrectasis and gastroptosis. Posterior gastrojejunostomy, no loop, suture. January 11, 1908.—No symptoms. Health very good. Gained 50 pounds.

LII. Patient 2226, 1906.—Female, aged 26. For 2 years has had continued "stomach trouble," marked pains in epigastrium, with vomiting. Has lost 30 pounds. Oper. 9–26–'06.—Ulcer of stomach. Posterior gastrojejunostomy, no loop, suture. January 15, 1908.—No symptoms. In good health.

LIII. Patient 2288, 1906.—Female, aged 27. For 4 months has had constant distress in stomach, worse about 2 hours after eating. No nausea or vomiting. No comfort after eating. Lost 20 pounds in 4 months. Oper. 10–3–'06.—Ulcer of duodenum. Posterior gastrojejunostomy, no loop, suture. January 14, 1908.—Still has "stomach trouble." Health not very good, but better than before operation.

LIV. Patient 2545, 1906.—Female, aged 18. For 2 years had noticed a "swelling" of the stomach which caused no inconvenience until 8 months ago. Then had throbbing in left hypochondrium just below costal margin. Pain constant; never referred to back or shoulders. Number of dark blood clots found in stools during last year. Patient thinks "swelling" has been more marked on right side than left, although pain has been worse on left side. Oper. 11–1–'06.—Stomach bulged out of wound. Enormously distended, walls thin. No apparent cause of distention. Posterior gastrojejunostomy, no loop, suture. February 10, 1908.—No symptoms. In good health.

LV. Patient 2611, 1906.—Female, aged 32. Had enteric fever 11 years ago. Had attack similar to present one 3 months ago, lasting 3 to 4 weeks. Sharp cutting pain in epigastrium extending downward into abdomen. Nauseated, but could not vomit. Pain constant last eight weeks. Pain relieved by eating. Oper. 11–10–'08.—No external evidence of disease in stomach. Stomach incised, mucosa greatly injected, bled easily when touched. Several small areas markedly hemorrhagic. One such spot ligated. Posterior gastrojejunostomy, no loop, suture. January 28, 1908.—Symptoms same as before operation. No improvement in general condition.

LVI. Patient 2726, 1906.—For 3 years has had "stomach trouble." Pains in epigastrium, sharp and cutting in character,

not relieved by food. Generally made worse. Never vomits, but is nauseated. Oper. 11–21–'06.—Ulcer of stomach with cicatrix near pylorus. Posterior gastrojejunostomy, no loop, suture. January 16, 1908.—For 6 weeks after operation had no symptoms. Since then has had "stomach trouble," but is much better than before operation.

LVII. Patient 2976, 1906.—Male, aged 39. For 3 months had sharp, stabbing epigastric pains, beginning 2 or 3 hours after eating. Relieved by eating. Vomiting marked, especially at night. Lost 40 pounds. Oper. 12–24–'06.—Ulcer of duodenum with periduodenal adhesions. Posterior gastrojejunostomy, no loop, suture. January 7, 1908.—No symptoms. "Never so well in my life." Gained 45 pounds.

LVIII. Patient 180, 1907.—Female, aged 32. Always had "stomach trouble." Burning epigastric pains, worse after eating, relieved by vomiting. No vomiting last 3 months, but pain is severe. Oper. 1–21–'07.—Ulcer of stomach. Posterior gastrojejunostomy, no loop, clamps. January 6, 1908.—No symptoms. In good health. "A new woman." Gained 20 pounds.

LIX. Patient 329, 1907.—Female, aged 47. For 6 months had sharp epigastric pains followed by vomiting, especially in evening. Pains relieved by food, temporarily, getting worse about 2 hours after meals. Oper. 2–4–'07.—Ulcer of duodenum with contraction. Posterior gastrojejunostomy, no loop, clamps. January 23, 1908.—No symptoms. Health steadily improving. Gained 33 pounds.

LX. Patient 570, 1907.—Female, aged 14. Oper. 2–28–'07.—Stomach greatly distended. Posterior gastrojejunostomy, no loop, clamps. January 23, 1908.—Stomach greatly improved. Nerves upset. Gained 25 pounds.

LXI. Patient 805, 1907.—Female, aged 38. Ten years ago began to have epigastric pains, relieved by vomiting. Pain cutting and severe. Vomiting relieved pain. Attacks at irregular intervals during last 10 years. Oper. 3–27–'07.—Ulcer of stomach with hour-glass contraction. Gastrogastrostomy, clamps, suture. Posterior gastrojejunostomy, no loop, clamps. January 7, 1908.—No symptoms. Very fine health. About same weight.

LXII. Patient 921, 1907.—Male, aged 56. Oper. 4–8–'07.—Ulcer of duodenum, beyond pylorus. Posterior gastrojejunos-

tomy, no loop, clamps. February 1, 1908.—No symptoms. In very good health. Gained 30 pounds.

LXIII. Patient 1060, 1907.—Male, aged 51. History of duodenal ulcer of 10 years' standing. Perforated day of operation. Oper. 4–21–'07.—Ulcer of duodenum, perforated. Duodenum infiltrated and thickened. Ulcer closed with silk Lembert suture. Posterior gastrojejunostomy, no loop, clamps. January 4, 1908.—No symptoms. Fine health. Twelve pounds heavier than average weight before operation.

LXIV. Patient 1236, 1907.—Male, aged 57. For 8 months has had attacks of nausea with vomiting, vomitus containing blood. Very little pain. Lost 30 pounds. Oper. 5–9–'07.—Pylorus thickened and indurated, lumen contracted, adhesions to adjacent viscera. Partial gastrectomy; posterior gastrojejunostomy, no loop, clamps. Pathological Diagnosis.—Chronic hyperplasia of pylorus. January 6, 1908.—No symptoms. Health steadily improving. Gained 10 pounds.

LXV. Patient 1606, 1907.—Male, aged 56. Fifteen years ago had gastritis, lasting 6 months. Vomited 15 minutes after meals. No nausea or pain. Few similar attacks until 6 months ago when there was great discomfort, vomiting of undigested food, but no blood. Oper. 6–24–'07.—Gastrectasis. Posterior gastrojejunostomy, no loop, clamps. January 16, 1908.—"Died this morning." No improvement since operation.

LXVI. Patient 1737, 1907.—Male, aged 56. For 8 months had annoying but not severe pains in epigastrium. No vomiting, no nausea. Pains at times dull and aching, relieved by food. Tenderness over epigastrium. Oper. 7–8–'07.—Ulcer of duodenum, with cicatrix. Posterior gastrojejunostomy, no loop, clamps. January 3, 1908.—No symptoms. Health steadily improving. Gained 10 pounds.

HOW FREQUENTLY DO GASTRIC ULCERS BECOME CARCINOMATA?*

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ALTHOUGH recognizing some of the dangers of gastric ulcer, such as hemorrhage and perforation, internists generally seem oblivious to other serious complications and sequelæ, particularly carcinoma, which I believe to be due in at least 50 per cent. of all cases, to a previous ulcer.

The idea that gastric ulcer may degenerate into carcinoma is not new, it having been enunciated in 1839 by Cruveilhier. Various references to the subject may be found in literature from that time to the present. Statistics concerning the frequency of the occurrence vary, but the latest studies give the highest percentage. Thus of 156 cases of gastric cancer examined post-mortem in the pathological institute at Kiel from 1872 to 1891, Sonnichsen found that 14 per cent. undoubtedly developed from ulcers; whereas Klausa, after studying 120 cases examined in the same institute from 1891 to 1900, found that 26 per cent. originated in ulcer. Stich states that ulcer carcinoma constitutes 30 per cent. of gastric cancers. W. J. Mayo found that in 54 per cent of the cases of gastric cancer submitted to resection in 1905–6 at the Rochester Clinic, both the clinical history and pathological examination of removed specimens made it certain the cancers had their origin in ulcers. Moynihan states that in his last 22 cases of gastric cancer a history of ulcer was present in 16 or 72.1 per cent.

Robson, in his Bradshaw Lecture, reports no less than 59.3 per cent. of his cases of cancer of the stomach giving a previous history of chronic ulcer.

Ssapeshko found that of 100 gastric carcinomas only ten cases did not originate on the base of a peptic ulcer. The same author reports cases which had developed pyloric carcinoma five

* Abstract of paper read before the American Surgical Association, May 5, 1908.

or six years after a gastro-enterostomy had been done for ulcer. Within two years I have had nine patients with cancer who gave an unmistakable history of ulcer.

Diagnosis is difficult. Cases have occurred in persons from 16 to 75 years old. The majority are in those past forty. In some cases the classical symptoms of chronic ulcer are so marked that there is no suspicion of carcinoma, and it is only when the abdomen is opened that the nature of the lesion is revealed. Even then mistakes have been made by those most experienced in gastric diseases. In other cases, after two or more years, the symptoms change so that malignant degeneration is suspected. Anorexia becomes pronounced, pain more constant, hæmatemesis more frequent, the vomited blood darker. Tuffier has described another form in which the symptoms of ulcer are absent, or present only in slight degree, but in which the signs of cancer soon develop rapidly.

Little is to be learned from gastric analysis as the chemical characteristics may be the same as in simple ulcer. Rapid and regular diminution or disappearance of hyperacidity at intervals is the most important sign. This phenomenon probably indicates that cancer is developing. The difficulty of diagnosis is the strongest plea that can be made for early exploratory operation in all gastric cases of doubtful nature failing to yield to medical treatment within a reasonable time. I advocate the *removal* of all suspicious lesions, by simple excision, pylorectomy, or partial gastrectomy, according to the conditions of the individual case.

GASTRIC AND DUODENAL ULCERS SECONDARY TO WOUNDS OF THE URINARY BLADDER*

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An instance of hæmatemesis and perforated gastric ulcer causing death after a successful suprapubic lithotomy happened in my work in 1886 and was reported by me in 1887.† A young surgeon, earnestly advocating the then generally disfavored high operation for stone in the urinary bladder, was naturally a good deal chagrined at the death of a patient from so unexpected a complication. I at first considered the vomiting of blood, which happened on the eighth day, and the perforation of the stomach wall, which took place nearly two months later, as the results of a prior latent gastric lesion. I concluded at a later date that the fatal ulceration of the stomach might be fairly attributed to the same etiology as the duodenal ulceration, familiar to surgeons in those days, after burns of the surface of the human body.

Two years ago sudden death came to one of my patients by reason of a massive hemorrhage from a duodenal ulcer nearly four weeks after a traumatic extraperitoneal rupture of the bladder with extravasation of urine. The patient had seemed to be convalescing, notwithstanding the severe lesion of the bladder and the adjacent regions. This case recalled so forcibly my early experience of a similar character that I entered upon a more careful study of the etiology of these post-operative gastro-intestinal lesions; which within a few years past have attracted surgical attention.

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* Read before the American Surgical Association, May 4, 1908.

† Proceedings of the Philadelphia County Medical Society, 1887, p. 8; Maryland Medical Journal, Baltimore, 1886–7, xvi, 259 and The Polyclinic, Philadelphia, 1886–7, iv, 246.

DEATH FROM PERFORATING GASTRIC ULCER TWO MONTHS AFTER SUPRAPUBIC LITHOTOMY.

CASE I.—In 1886 I operated in the Pennsylvania Hospital on a very fat man, with a poor circulation, aged 63 years, and by a suprapubic cut easily removed a large flat stone from the bladder. The bladder wall, the rectus muscles and the skin were closed by three tiers of catgut sutures, and a drainage-tube was inserted to drain the space between the anterior wall of the bladder and the pubic bone. The wound was dressed with gauze wet with a solution of mercuric chloride, after its edges had been dusted with iodoform. A catheter was kept in the urethra and bladder for twenty-four hours.

Some time before the lithotomy I had attempted to crush the stone with the lithotrite after having accustomed the capacious urethra to the contact of instruments by passing bougies. The stone was, however, too large to be grasped by the lithotrite and litholapaxy was abandoned. After a proper period of inactivity I etherized the man and introduced a rubber bag into the rectum and elevated the bladder by injecting twelve fluidounces of warm water into the bag. The bladder was then distended with from six to eight fluidounces of weak solution of mercuric chloride and the suprapubic opening made. The layer of fat in the superficial fascia was nearly two inches thick. The technic of these operative procedures was that usual at the date of operation. They seem somewhat antiquated now.

In about five days the drainage-tube was withdrawn and by the eighth day all the sutures in the skin were removed. Some urine escaped from the opening left by the drainage-tube, though the bladder was frequently emptied with a catheter. On the evening of the eighth day the patient vomited about six fluidounces of blood. During the straining of vomiting on that day and on account of sitting up in bed a few days later, the wound burst open throughout its entire length. The edges of the reopened wound were brought together by sutures of silk-worm gut and shot.

The man's local condition continued pretty good, though his general condition was bad. The deep part of the wound closed and he passed urine normally by the urethra without any escape through the hypogastric cut. The wound in the skin and fat,

however, was covered with sluggish granulations and repair therein was very inactive. The patient had persistent nausea, a dull uncomfortable feeling in the epigastrium and a marked loss of appetite. Disease of the liver or stomach was discussed, but no diagnosis was reached. This was due probably to the fact that twenty odd years ago surgeons were not so familiar with gastric ulceration as now. Efforts were made to improve his nutrition without much avail. Gradually he improved sufficiently to sit up in a chair daily, and the wound in the abdominal wall was almost completely healed. He had no urinary difficulty and was very comfortable except for great weakness and the continuance of pain at the epigastrium.

Two months after operation he was suddenly seized with intense pain in the epigastrium. This was immediately followed by profound shock, which continued without reaction until death occurred a few hours later. The necropsy disclosed a gastric ulcer, about one and a quarter inches in diameter, which by perforation had permitted the contents of the stomach to escape into the peritoneal cavity.

DEATH FROM DUODENAL ULCER NEARLY FOUR WEEKS AFTER RUPTURE OF THE BLADDER.

CASE II.—In February, 1906, a man of 23 years was admitted to the Polyclinic Hospital with fracture of the pelvis and extraperitoneal rupture of the bladder, caused by some iron beams falling upon him. There was a fracture at the pubes and a fracture or dislocation posteriorly. Marked extravasation of urine and severe hemorrhage took place into the tissues in front of the bladder, causing a large elliptical swelling to develop above the right Poupart's ligament. This swelling, which extended from the middle line towards the crest of the right ilium, was drained by a seven inch incision, above Poupart's ligament, and the introduction of a large drainage-tube. Urine escaped freely from the drainage-tube and was withdrawn from the bladder by urethral catheterization for about two weeks. At the end of three weeks the tube was removed, because the temperature, as well as the local condition and the general symptoms of the patient, seemed to warrant the belief that serious septicæmia had been averted and that recovery would take place. The patient gave a history of two attacks of gonorrhœa, the last of which

occurred two years before. His urine showed a trace of albumin and red blood cells when examined after the injury. Later it contained pus and streptococci. His temperature was normal when he was admitted. Then it oscillated and about a week after his injury reached 103°. Later it was from normal to 100°.

The man gained strength, though he was pale, the wound in the abdominal wall closed, and his bladder was able to take care of urination, expelling as much as twelve fluidounces during a urination. The urine contained some pus. The normal temperature and the rather frequent pulse showed nothing to excite special anxiety. The patient on the twenty-second day complained of some pain in his upper abdomen; but he slept fairly well, though a little restless and weak.

On the twenty-sixth day he had a sudden collapse, shown by a weak irregular pulse, rapidity of respiration and free sweating. When I saw him a few hours later he was greatly prostrated and said that he felt as if he were being blown up inside his abdomen. He was evidently going to die. Catheterization obtained a considerable quantity of urine of a normal appearance. I was at a loss to explain the symptoms. He died early the next morning, despite active stimulation, with sudden symptoms of another collapse.

The necropsy was made by Dr. John M. Swan, the Clinical Pathologist of the Hospital. The important findings were:

The pelvic peritoneum was discolored a bluish-black. The discoloration extended upwards on both sides well towards the diaphragm. This was probably due to the extravasation of blood, which occurred when the pelvic girdle gave way posteriorly at the time the man was crushed under the falling iron. There was no fluid in the abdominal cavity. The retroperitoneal lymph-nodes were slightly enlarged.

The bladder was empty except that it contained a very small quantity of very purulent fluid. It was ruptured in front just above the prostate gland and communicated through this opening with a large cavity running between the separated portions of the pubic bones, the ends of which were bare and roughened. The cavity extended downwards and backwards to the right along the rami of the pubes and ischium as far as the tuberosity of the latter. In addition there was an extension of the septic

cavity down the side of the right thigh to a point four inches below the groin.

The intestines were greatly distended everywhere except at the sigmoid flexure where there was a marked contraction. The large intestine was very much distended and contained a large quantity of blood-stained contents; its mucous membrane, which was thickened and reddish, was studded with minute elevations with a blackish centre and was intensely stained with extravasated blood. The small intestine contained a small amount of blood-stained material. In the jejunum the mucous membrane showed the normal rugæ stained red. The mucous membrane of the ileum was quite red, becoming in some places dark brown; at the lower part of the ileum the staining became quite black. On the posterior wall of the duodenum just below the pyloric ring was an ulcer about three-quarters of an inch in diameter. It was rounded with undermined edges; in its bottom there was a small area, which appeared to be covered with a small blood clot. When this clot was removed, an open blood vessel, almost two millimetres in diameter, was seen. The base of the ulcer was almost directly against the pancreas, which is here normally adjacent to and connected with the duodenum.

The stomach was distended with a large quantity of blood and blood-stained food particles. The large amount of clotted blood formed almost a complete cast of the stomach. The gastric mucous membrane was coated with mucus and was blood-stained. No ulcers were present.

The pancreas was fatty, as was the liver. The pancreas, spleen, kidneys and liver were anæmic. The lungs were hypostatically congested and œdematous. The arch of the aorta showed atheroma, the myocardium was anæmic.

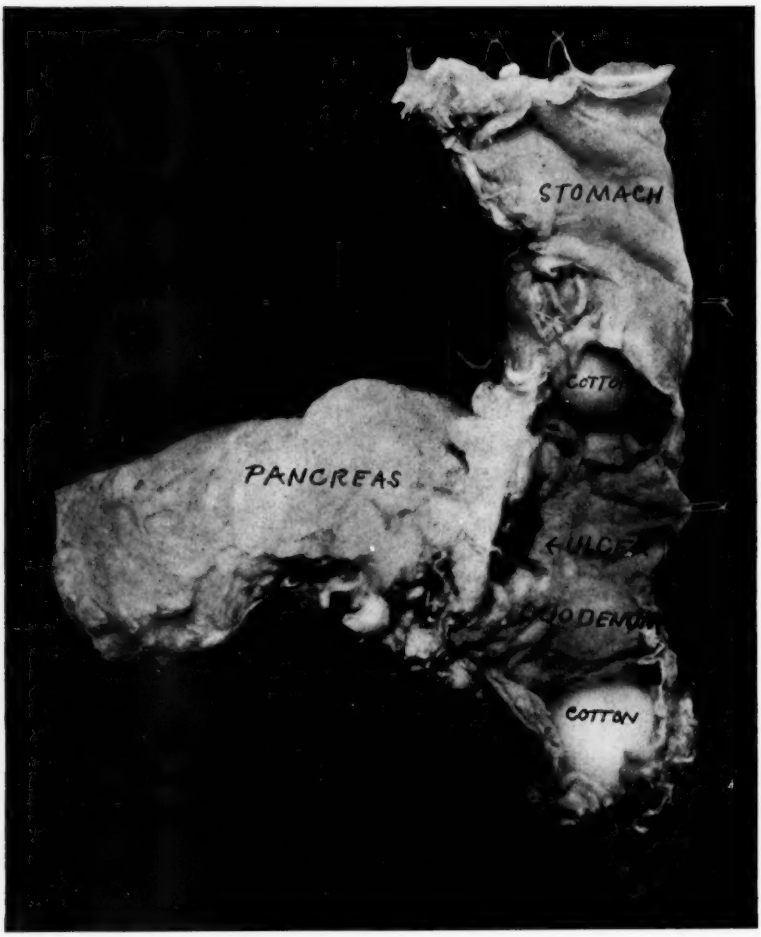
The organic lesions found were fracture of the pelvis, extra-peritoneal rupture of the bladder, chronic abscess of the pelvis and perineum, acute colitis, ulcer of the duodenum with hemorrhage and hemorrhagic infiltration behind the peritoneum. The cause of death was profuse hemorrhage into the alimentary canal.

Careful questioning of the young man's mother after his death failed to elicit any history of previous spitting or vomiting of blood. She insisted that he had never had pain or indigestion after eating, even when taking sour or highly seasoned food. I therefore reached the conclusion that the colitis and the fatal

FIG. 1.

Microscopic view of tissue from wall and floor of ulcer of duodenum. *A*, mucosa; *B*, glands of Brunner; *C*, circular, and *D*, longitudinal muscular fibres; *E*, floor of ulcer; *F*, fibrous connective tissue between intestine and pancreas; *G*, pancreas; *H*, artery from which hemorrhage occurred.

FIG. 2.



Duodenal ulcer secondary to rupture of bladder. Dr. Roberts' case. Stomach and duodenum distended with cotton; pancreas displaced to display specimen, which is mounted in gelatin in a flat jar.

ulceration of the duodenum were sequences of the pelvic suppuration resulting from the rupture of the bladder, similar to duodenal ulceration which occurs at times subsequent to burning or freezing of the surface of the body. It must be admitted that the mother's decided negations may have been inspired by the fact that her son had been injured by an accident, and that she therefore may have wished to accentuate his previous healthy condition.

Dr. James A. Kelly, the surgical pathologist of the Polyclinic Hospital, made a microscopic examination of the ulcerative process and mounted the specimen for macroscopic inspection. He says:

"Microscopic examination of tissue removed from side and floor of ulcer of duodenum shows normal mucosa, submucosa and muscular layers of duodenum forming side of ulcer, excepting for moderate round-cell infiltration of all layers and some deposit of fibrin and blood on surface of mucosa. At the site of the ulcer all the layers of the duodenum have been destroyed and replaced by necrotic tissue containing a few leucocytes and fibrin. The floor of ulcer below necrotic area is made up of fully formed adult connective tissue and is firmly adherent to pancreas. The section contains a cross-section of the artery, from which hemorrhage occurred and which does not show any signs of embolus or thrombus. The fibrous tissue indicates in my opinion an ulcerative process not of recent date." (Fig. 1.)

It may be contended that in both of these cases the gastrointestinal ulceration had existed previously to the traumatism of the bladder. Two months and nearly four weeks respectively, however, might, it would seem to me, be sufficient time to develop an ulcer having characteristics similar to those seen in the usual chronic peptic ulcer of the stomach and duodenum. No microscopic examination was made in the first case; in the second Dr. Kelly's report is appended. He, however, gives no definite opinion as to the exact age of the lesion, though he looks upon it as a chronic sore. I do not know that pathologists possess exact information as to the time really required to produce the histological changes seen in the section. It is known, however, that after gastrojejunostomy peptic ulcer of the jejunum may occur very early. Mr. Moynihan has re-

corded [1] death from perforation of such a jejunal ulcer about eleven days after operation, and mentions that he knows of a case in which such a fatality took place in five days after operation. These instances apparently indicate that four to eight weeks was not too short a time in which to have developed the ulcerations found in my cases here reported.

It is impossible to fix the time of origin of these lesions and indeed their pathological connection with the bladder traumatism may be disputed. Three possibilities present themselves to one's mind.

The ulcerative process might have no connection whatever with the suprapubic lithotomy in the one patient or the accidental injury of the pelvic structures in the other.

The operative and accidental disturbances might on the other hand be the direct cause of the cytological and histological changes leading to hemorrhage, ulceration and perforation. A difficulty of explaining this relation by present pathological knowledge does not preclude the possibility. Thrombosis, embolism, toxæmia, and other influences of circulatory and nervous origin might readily lower the resistance of the cells of the mucosa to the digestive action of the fluids of the stomach and duodenum, and open the way to autodigestion and ulceration.

The surgical disturbance of the patient's structures, might in the third place be the cause of a renewal of activity in a latent or healing ulceration. Varicose veins in the mucosa of œsophagus, stomach or duodenum and congestion of the portal system from hepatic cirrhosis or heart disease, or general arteriosclerosis might be contributing causes.

I insert here brief notes of cases similar to those just reported by me, which I have collected from literature:

CASE III.—*Suprapubic Lithotomy followed by Death from Hæmatemesis Eight Days after Operation; Small Gastric Ulcer.* BROCA reports [2] the following case: A man 65 years old, not manifestly an alcoholic, had been in previous good health except that for seven years he had symptoms

[1] Trans. American Surgical Assn., 1908.

[2] Bull. et mém. de la Soc. de Chirurgie de Paris, 1900, xxvi, 858.

of vesical stone. He applied for hospital treatment because fifteen days previously he had had marked hæmaturia lasting a whole night. The patient was rather fat and showed no vesical symptoms, except a slight degree of pulmonary emphysema. By suprapubic lithotomy Broca removed on October 16, 1891, a large uric acid stone. He sutured the bladder, leaving a large tube in the bladder for drainage. On the third day, the temperature being 38° C., the patient was doing well, though some urine was escaping by the hypogastric wound. Local and general conditions were good until the evening of the sixth day, when, without suppuration in the wound and without fever, an abundant hæmatemesis took place. This was treated with ice externally and internally and ergotin. The next morning the patient was very feeble and very pale; but, on the following day, which was the eighth after operation, hæmatemesis and the passage of blood in the stools occurred and he died in the evening.

Necropsy showed stomach and intestine full of blood. No definite ulceration in the stomach was at first evident. No œsophageal varices and no evident vascular rupture were found, but the whole gastric mucosa presented a marked wine color tint. Transmitted light revealed on the greater curvature at the junction of two vessels, an ulcer as large as a lentil. The abdominal wound was normal, showing no suppuration, and the vesical wound was united except at the point where the drain prevented union.

The liver appeared macroscopically to be normal but histological examination showed beginning cirrhosis. Atheromatous change was very clear in the coronary arteries of the heart and in the aorta. Renal sclerosis was present. The stomach submucosa was infiltrated with interstitial hemorrhages and its vessels were atheromatous. The only pathological change explaining the lesion and the hæmatemesis was arterial atheroma.

CASE IV.—*Lithotomy Associated with Chronic Nephritis and Duodenal Ulcer; Death in Two Days.* PERRY and SHAW give[1] the history of a man aged 62 years who had had symptoms of stone in the bladder for eight years. After lithotomy, probably perineal, two large calculi were removed from the bladder. The man had delirium and died in two days. The autopsy showed tubal nephritis and a duodenal ulcer just beyond the pylorus with a linear cicatrix around it. The ulcer was considered by the reporters to be an old ulcer which had partially healed.

CASES V and VI.—*Duodenal Ulcers Associated with Pyonephrosis and Perinephric Abscess. Duodenal Ulcer Associated with Perineal Abscess and Scrofulous Kidney.* The same authors report two other cases of duodenal ulcer found in patients dying with septicæmia associated with disease of the kidney of various types. In one of the cases there was pyonephrosis and perinephric abscess; in another a perineal abscess associated with a scrofulous kidney.

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[1] Guy's Hospital Reports, 1893, p. 187—.

CASE VII.—*Litholapaxy followed by Hæmatemesis. Death on Third Day.* PURVES reports a case operated upon by Annandale.[4] The patient, a man of 67 years, had no gastric trouble previously. Urine was normal. On October 18, 1900, a uric acid stone was crushed and removed. There was no vomiting from the chloroform administered as an anæsthetic. Three hours after the operation the man vomited a small amount of coffee-ground colored fluid without severe retching and without pain. On the next day he complained of some epigastric discomfort. The following day he was better. There was no pus in the urine. Sixty hours after operation the man vomited 10 ounces of black fluid, became collapsed, and had an intermittent pulse and some distention of the abdomen. He was treated with strychnia, strophanthus and lavage of the stomach with hot water. He fell in collapse again and died without further vomiting five hours later. No autopsy was made. The reporter is not certain that sepsis was present in this case, but the man's general condition and the tympanites make it, he thinks, very probable.

CASE VIII.—*Lumbar Nephrotomy followed by Hæmatemesis. Death in Thirty-six hours.* In the same article is recorded another case occuring in the service of Annandale in 1901. A man of 50 years had suffered with renal colic for 11 years. There was no history of gastric trouble. After lumbar nephrotomy for renal calculi which was unaccompanied by chloroform vomiting, the man vomited blood. This occurred 18 hours after operation and the patient died 36 hours subsequent to that procedure. The urine had been found purulent but there was no mention of a chemical examination having been made. The autopsy showed pus in the kidney. No ulceration was found in the stomach or duodenum.

CASE IX.—*Suprapubic Lithotomy, Hæmatemesis. Death on the Third Day. Two Ulcers found in the Stomach.* PURVES in the same collection records the history of a patient operated upon by Chiene. A man of 62 years had exhibited symptoms of vesical calculus for three years. He recently had developed a cystitis but had never passed blood in the urine. The urine was purulent. There was no history of gastric trouble. Chiene did a suprapubic lithotomy in 1893 and drained the bladder. There was some vomiting from the chloroform. Forty-six hours after operation the patient vomited clotted blood in large quantity and died 54 hours subsequent to operation. The autopsy revealed extensive atheroma. The stomach and upper part of the intestine contained dark blood. Two old ulcers were situated on the lesser curvature of the stomach. An arterial branch close to one of the ulcers had a clot in it discolored by stomach contents, but no perforation in the vessel could be established. There was calculous pyelitis of the right kidney.

CASE X.—*Lumbar Nephrotomy followed by Hæmatemesis. Fatal on the Third Day.* PURVES also mentions in the same article another case operated upon by Annandale. In this instance the man was young, being only 27 years of age. Two uric acid calculi were removed from the right kidney, presumably by lumbar nephrotomy. The chloroform sick-

[4] Edinburg Medical Journal, 1902, liii, p. 238.

ness, which was slight at first, increased in frequency on the following day and became more violent in the next 24 hours. Forty hours after operation, black fluid containing blood replaced the bilious vomiting and continued until death 52 hours after operation, which was 12 hours after the onset of hæmatemesis. There was no autopsy and there is no mention in the report as to whether there had been previous symptoms of gastro-intestinal trouble. There is no statement as to the coincidence of suppuration or septic symptoms. The fact that the bloody vomit replaced a previous bilious vomiting would, perhaps, indicate that the lesion was duodenal rather than gastric.

This collection of cases from one city and in the practice of two surgeons, connected with one hospital, indicates that the condition is probably not unusual. A careful search of clinical records will probably result in the discovery of many additional instances.

Guyon reports [5] three cases of hæmatemesis after urinary infection. Recovery took place in two of the cases, and hence no exact knowledge of the gastro-intestinal lesions is possible in those instances.

CASE XI.—*Hæmatemesis Preceding Death from Coma in a Patient with Urethral Stricture. Genito-Urinary Infection.* A man of 71 years came under the observation of Guyon on February 19, 1901 in a comatose state with evidences of advanced urinary infection, but not in a condition for operative treatment. Repeated, violent hæmatemesis occurred, and he died in coma on the second day. Autopsy showed urethral stricture and ulceration, cystitis and phlegmonous pericystitis, abscess in the bladder wall, ureteritis and pyelitis. The kidneys macroscopically did not seem much damaged. The stomach was filled with blood. No ulceration of the gastric mucosa appeared to exist, nor was any lesion found in the œsophagus or duodenum. There was merely a bloody effusion in the subumcosa of the stomach in the pyloric region, without evident solution of continuity of the mucosa. Histological examination had not been made at the time of the report. The intestinal canal was otherwise normal macroscopically. There was no peritonitis, no appendicitis, and no evident lesion macroscopically of liver, heart, or spleen. The lungs were slightly congested at base. Microscopical study had not been made.

CASE XII.—*Hæmatemesis after Perineal Incisions for Extravasation of Urine in Urethral Stricture. Recovery.* A man of 55 years was

[5] Sur les hématémèses toxi-infectieuses. Bull. de l'Académie de Médecine, 1901, xlv, 226.

operated upon by Guyon in 1878 for stricture of urethra by internal urethrotomy. In 1896 he suffered from infiltration of urine after mala-

droit catheterization. Incisions were made in the perineum and he rapidly improved. When he was supposed to be out of danger an abundant vomiting of blood occurred. The blood was mixed with blackish clots. Recovery took place under the use of ice by the mouth. No recurrence has taken place. The man was seen at various times for several years afterwards.

CASE XIII.—*Hæmatemesis after Suprapubic Removal of a Vesical Tumor. Recovery.* A man, aged 53 years, had a urethral stricture, which had been successfully treated by gradual dilatation in 1894. Guyon states that about seven months later he complained of bloody urine, which was said to have existed for two years. In July 1895 a growth was removed from the bladder by a suprapubic cut. A few days later the patient had quite abundant hæmatemesis which disappeared spontaneously in two or three days and did not return. The man was septic and had at the end of a month a phlebitis of the left leg which lasted about six weeks. He was not seen again after he left the hospital.

CASE XIV.—*Fatal Intestinal Hæmorrhage after Lumbar Nephrotomy.* SUMMERS[6] operated upon a woman, aged 25 years, who was six months pregnant, for an acute pyonephrosis of the right kidney. He made a vertical cut in the loin. One week later the infection occurred in the left kidney also, which he similarly drained. There was more than usual manipulation of the mesocolon on the left side, though the peritoneum was not opened. It was observed that on that side the colon had a short mesocolon. Twenty-four hours later abortion took place. On the fourth day after the second lumbar nephrotomy terrible intestinal hemorrhages occurred, resulting in death. No macroscopic ulcerations were found in the descending colon, but the mucosa was blood-stained. No further necropsy findings are mentioned.

Noble and Wathen have, according to Rodman[7] each seen fatal gastric hemorrhage after nephrorrhaphy. The record is as follows:

CASE XV.—*Gastric and Intestinal Hemorrhage after Bilateral Nephrorrhaphy. Death on Twelfth Day.* NOBLE operated on a young woman for fixing the kidneys and lost his patient on the twelfth day from hemorrhage from the stomach and bowels. No autopsy was obtainable.

CASE XVI.—*Death from Gastric Hemorrhage after Nephrorrhaphy.* WATHEN saw hæmatemesis occur over a week after an operation for fixing the movable kidney of a young neurotic woman. Death took place two or three days later. No autopsy was held.

In this series I have collected 16 instances of gastro-intestinal bleeding subsequent to operative or other lesions of the

[6] Medical Herald, St. Joseph, Missouri, November, 1906.

[7] Philadelphia Medical Journal, June 19, 1900.

urinary organs. The result was death in 14 cases, recovery in 2.

There were operations: for cystotomy, 5; for litholapaxy, 1; for nephrotomy, 3; for extravasation of urine, bladder or urethra, 2; for nephrorrhaphy, 2.

There were nonoperative lesions in three, viz.: pericystic abscess, etc., 1; perinephric abscess, etc., 1; perineal abscess, etc., 1.

In 7 of the 10 fatal cases ulceration was found at autopsy; in several of the remaining cases no necropsy was made and the question of the presence of ulcer of the stomach or intestine remains undetermined.

Curling said sixty-four years ago in his classic paper [8] on duodenal ulcers secondary to burns of the skin: "I have seen ulcers of this form in the same part of the intestine in other cases besides burns." In discussing duodenal ulceration after burns he called attention to the tendency of the ulcers to be situated in the first part of the duodenum and on its posterior wall, where it is close to the pancreas. He said that the ulcer is apt to have the pancreas for its base and that a large open vessel is often seen on the floor of the ulcer. In most of the cases reported by him death occurred in from seven to ten days after the injury. He raised the question of a possible connection of the ulcerative process with Brunner's glands. In a woman, who died late of burns, he saw a healed ulcer in the duodenum, which he considered to be the scar of a lesion consecutive to the burns.

Curling shows that Dupuytren had noted the occurrence of intestinal ulceration after burns, but calls attention to the fact that he did not seem to have recognized the special liability of the duodenum to this pathological process. It is interesting to note the similarity of the lesion in the second case of wound of the urinary bladder recorded by me in this paper with that described by Curling as a sequel to burns.

Little or no attention appears to have been paid by clinical observers or pathological investigators to Curling's statement

[8] Medico-Chirurgical Transactions 1842, vii, 277.

that duodenal ulcer was at times a sequel of other surgical lesions than burns.

For many years I have regarded the gastric bleeding and ulceration, which killed my suprapubic lithotomy case of 1886, as an evidence of a pathological sequence similar to that which takes place in the duodenum after extensive burning and, I believe, also after extensive destruction of the integument from freezing.[9] The advent of antiseptic and aseptic methods in surgery has apparently been responsible for a marked elimination of duodenal ulcers secondary to these conditions. Whereas Holmes and Collins found this sequel in about 12 per cent. of their collection of burns, Lockwood has later found only one such ulcer in 138 cases treated with more or less successful attempts at antisepsis.[10]

Hæmatemesis and intestinal bleeding, as well as secondary ulceration of the stomach and duodenum, have attracted the attention of surgeons within recent years as symptoms seen occasionally after intraperitoneal lesions. Thus Dieulafoy, Eiselsberg, Lieblein, Kehr, Rodman, Summers, Macrae, Bogolubow, Purves, Sauvé and others have written on their connection with hernia, appendicitis, gall-bladder and gall-duct disease, and operations involving the great omentum or mesentery.

The association of these symptoms with lesions of a surgical nature unconnected directly with the peritoneum has, however, not been studied very thoroughly. This is rather strange, since, as has been stated, Curling referred to the subject over a half century ago. Samuel Fenwick and S. W. Fenwick do, however, devote a few pages[11] to secondary ulcers of the stomach and duodenum. They say that they are associated with infective disorders, portal obstruction, and trauma; but seem to lay most stress on their septic origin.

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[9] Deutsche Chirurgie, Lieferung xvii, Ueber Verbrennungen und Erfrierungen.

[10] Journal of the American Medical Association, Aug. 4, 1906.

[11] Ulcer of the Stomach and Duodenum and its Consequences, Philadelphia, 1900, p. 146 and 158.

In 1893 Perry and Shaw [12] made this statement: "The association of ulceration of the duodenum with general septic or pyæmic conditions has not, so far as we know, attracted attention in this country, although the fact that such an association existed was long ago suspected, we believe, by Billroth." These writers reported 18 ulcers of the duodenum to illustrate this connection out of a total of 70 duodenal ulcers from all causes in Guy's Hospital. They had knowledge of 3 additional cases not occurring in that institution, making in all 21 duodenal ulcerations in septic conditions. The septicæmia was the result of sloughing of the scrotum, perineal abscess, perinephric abscess, bed-sores, middle ear disease, cellulitis, sloughing of the skin, puerperal sepsis and various other affections. The same authors attribute [13] to Moxon the suggestion that duodenal and gastric ulcers are often associated with nephritis; and as evidence report autopsy records of 12 cases of ulcer of the duodenum associated with nephritis in Guy's Hospital, and 4 additional cases collected from other sources. Of the 12 patients, 7 showed interstitial nephritis, 4 tubal nephritis and 1 interstitial and tubal nephritis. Lecointe, Mathieu & Roux, Imerwol and others have studied this question more recently.

The etiology of the gastro-intestinal lesions under consideration is obscure, but it is probably usually, though not always, connected with the occurrence of thrombosis and embolism due to septicæmia or toxæmia. Septic and urinary conditions giving rise to ammonium salts in the blood in large amounts have been especially accused as etiological factors. Cases are mentioned of such hemorrhage and ulceration occurring after operative procedures on regions far away from the abdomen and pelvis. Fracture of an extremity, excision of the Gasserian ganglion, amputation of the thigh, removal of neuromatous tumor, excision of malignant disease of the palate and tonsils, and other surgical traumatisms followed by hæmatemesis or

[12] Guy's Hosp. Reports, 1893, 187
[13] Guy's Hosp. Reports, 1893, 190.

bleeding from the bowel have been reported a few times. These cases apparently prove that the postoperative bleeding and ulceration of the gastro-intestinal tract are caused by some more general pathological influence than local interference with the abdominal and pelvic circulation alone. Experimental and clinical evidence of such hemorrhage and ulceration occurring through infection with the pneumococcus, the meningococcus, the diphtheria bacillus, the colon bacillus, a staphylococcus, and from uræmic conditions give credence to the theory that changes in the gastric and intestinal mucosa leading to fatal issue may be the result of several local influences and also of a widespread pathological alteration in the cells and fluids of the body.

Letulle suggested[14] in 1888 that gastric and duodenal ulcers might be due to a previously existing infectious disease, from which the patient had recovered more or less recently. He mentions as confirmatory of this idea instances of ulcer subsequent to antral suppuration in the upper jaw, smallpox, suppurating lymphangitis of lower extremity, chronic glanders. Gonorrhœa had existed in the second of my cases here reported.

Nearly all the papers on this topic have discussed the questions from the idea that the operations causing the secondary phenomena under discussion must in some direct way involve the portal circulation. Although such lesions are probably more apt to occur after interference with the pelvic and abdominal organs, which are connected with the portal circulation, enough cases are on record to lead to a belief that a general condition, such as uræmic intoxication, atheroma of the vessels, toxæmia, or infection, is instrumental in rendering the patient liable to the serious complication discussed. Investigation has been made by a number of experimenters upon the production of gastric and duodenal ulcers by interference with the nervous connections of the gastro-intestinal tract. In operative cases the high pelvic position of Trendelenburg may perhaps have an influence in disturbing the gastric and duo-

[14] Acad. des Sciences et Soc. méd. des hôpitaux, 1888, quoted by Debove and Renault in Ulcère de l'estomæ, Paris, 1892, p. 60.

denal circulation and causing congestion of, or extravasation in, the mucosa.

Hort, of Torquay, makes the suggestion that some forms of gastric and duodenal ulcers may be only local expressions of a general blood disease not heretofore recognized. His paper states that the occurrence of such ulcers depends upon a break-down of the normal immunity of the gastric mucosa against autodigestion through destruction of the antipeptic bodies caused by thrombosis, embolism, necrosis or other processes.

The ulcer itself is due apparently in his opinion to the presence in the blood of floating hæmorrhagins, mucolysins, and other cystolysins, affecting the mucosa through one of two channels—either from the lymph-stream constantly flooding the epithelial cells with the specific toxins (mucolysins) or from the escaped blood charged with the same bodies.

Purves believes that the condition is frequently an obvious toxæmia from a recognizable septic infection of the wound.

In these cases which I am discussing there is possibly a uræmic toxæmia in addition to the septic toxæmia and infection. The mechanism of the thrombotic or embolic processes may therefore be more readily accounted for.

The serious prognosis in postoperative hæmatemesis or bloody stools is to be insisted upon.

Purves says that the more marked the septic reaction in the wound, as shown by its discharges and the high temperature of the patient, the better is the chance for the patient's recovery. He believes that a subdued or masked infection, with subnormal temperature, frequent pulse, a rapidly increasing vital depression and vomiting tending to become regurgitant, renders the prognosis graver. In his opinion the occurrence of bilious vomiting after one or two attacks of bloody vomit indicates a favorable outcome of the case.

The treatment may be divided into the prophylactic, general, and local. The recognition of the fact that the bleeding

[18] Lancet, 1907, ii, 1744.

in some cases at least may be due to trauma of the vessels of the mesentery or great omentum suggests that the intra-abdominal organs should be handled with the utmost gentleness in all operative procedures. The probability that sepsis is the basis of this unfortunate complication in a great proportion of cases makes it desirable that all wounds, operative or accidental, intra-abdominal or extra-abdominal, be kept aseptic or quickly be made so. These two precautionary measures are the prophylactic means that the surgeon should always have in mind.

The general treatment consists in relieving the grave anæmia and the depression which result from the loss of blood, whether it be retained within the stomach and intestines, or ejected by vomiting or stool. When there is no external evidence of bleeding by hæmatemesis or bloody dejections, the surgeon may fail to recognize the cause of the sudden collapse of his patient. The occasional advent of postoperative gastro-intestinal bleeding should always be remembered. Hypodermic injections of strychnia, rectal enemas containing alcohol or other stimulants and nutritive materials, and, perhaps, the use of ergotin subcutaneously, are indications in this instance as in other cases of hemorrhage. If the patient has been in the high pelvic position, and it is believed that congestion of the stomach and intestines is increased by this posture, he should be restored to the horizontal position. This change in posture should be made gradually. It may, however, be improper, if there is danger of cerebral anæmia resulting from the altered posture. It is possible that in some instances elevation of the shoulders and head so that the patient occupies a semi-sitting posture may be thought wise. This may lessen a congestion of the liver, stomach and duodenum, if it be due to cardiac disease, for example, by increasing the hypostatic congestion of the pelvic organs and lower extremities. Cording the limbs so as to increase their venous congestion may perhaps aid in a similar manner. Autotransfusion, so-called, induced by applying bandages of rubber to the four extremities so as to drive the blood from them may be available in increasing the

amount of blood in the brain and medulla oblongata. Hypodermoclysis or intravenous injection of warm saline solution or arterial anastomosis with a healthy individual may be valuable in selected cases. It is not impossible that instances might arise in which phlebotomy may be justified to relieve the engorgement of the right heart, the liver and the mucous membrane of the gastro-intestinal tract.

Local measures should consist in total abstinence from the introduction of food into the stomach, though nutrient enemas may be employed. The stomach should be cleared of clotted blood and acid secretions by irrigation with a 2 per cent. sodium bicarbonate solution of a temperature of from 110–120° F. Rodman has recommended that the stomach be washed out with hot water of 120–130° F.[16] After the stomach has been emptied of its contents by repeated irrigation, nitrate of silver solution 1–1000 has been employed through a stomach tube and followed by ice cold water irrigation. It would seem to me that the hot water treatment is better than that by ice cold water. Ice has been applied to the epigastrium in some cases. High enemas of hot water have been given for the purpose of clearing out the bowel and aiding in the arrest of the bleeding. Full doses of bismuth subnitrate might be given by the mouth with advantage. The use of adrenalin and cocaine solutions introduced into the stomach has been suggested, but their value may be considered doubtful.

Most writers on the subject under consideration have looked upon the surgical treatment of the bleeding point as unwise. They have usually counselled a reliance upon medical measures such as those already described. It is conceivable, however, that, if the condition of the patient warranted it, local treatment of the ulcer in the stomach or duodenum should be instituted.

Gastro-enterostomy, excision of the ulcer, or ligation of the bleeding point suggest themselves. An incision in the stomach opposite to the bleeding point would, perhaps, permit the surgeon's finger, placed behind the ulcer, to push the bleed-

[16] Jour. Am. Med. Assn., Sept. 15, 1906, p. 842.

ing surface through the opening and enable him to encircle the vessel with a purse-string suture carried through the mucous membrane and submucous coat.

Summers once operated by opening the abdomen, incising the stomach and irrigating it with hot water. The patient seemed to be benefited, but the hemorrhage recurred and death finally took place. He suggests the possibility of using with advantage continuous irrigation, either through the œsophagus, or through a fistula made in the stomach.

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INFANTILE HYPERTROPHIC STENOSIS OF PYLORUS.*

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AUTHOR reports a case of operation for pyloric stenosis in an infant 4½ weeks old. The pylorus was found thickened and hard, and, deeming it impossible to perform a pyloroplasty, an anterior gastro-enterostomy was made. The child recovered and is still living eleven months from date of operation.

In addition to the 89 operative cases collected by Dr. Thompson in 1906, 25 operative cases have been collected by Dr. Bunts, and an endeavor made to ascertain the principal causes of death in the various operations performed and to estimate the probable percentage of recoveries and the prospects, if any, of improvement in operative results.

Of the total 114 cases, 53 recovered and 61 died, a mortality of 55 per cent., distributed as follows:

	Cases	Recovered	Died	Mortality. Per Cent.
Divulsion	27	13	14	51.8
Gastro-enterostomy ...	69	32	37	53.6
Pyloroplasty	17	8	9	53
Pylorectomy	1	0	1	100

No improvement but rather a higher mortality was shown in the last 25 cases.

The paper concludes as follows:

If one would be entitled to draw any conclusions from this résumé, they would be:

1. Congenital stenosis and infantile stenosis are of decidedly different clinical significance.

2. Congenital pyloric stenosis would in all cases call for very early operative interference.

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* Author's abstract of paper read before the American Surgical Association, May 4, 1908.

3. Infantile pyloric stenosis develops after birth and is often amenable to medical treatment, but in the absence of improvement an early operation offers an excellent prospect of recovery.

4. There does not seem to be as yet any positive way to distinguish between the congenital and infantile forms. The earlier the symptoms, the more probable the congenital form.

5. In selected cases pyloroplasty offers results superior to those of gastro-enterostomy, and should be the operation of choice.

6. There has been no recent improvement in operative results.

7. The one great determining cause of death in practically all cases is delay, and it is obvious that until this obstacle is removed by the medical attendant, little or no improvement on the present statistics can be expected.

MELANOTIC SARCOMA OF THE COMMON BILE DUCT AND THE AMPULLA OF VATER.*

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OF MONTREAL.
Surgeon to the Montreal General Hospital.

THE rarity and obscurity of this case constitutes my apology for reporting it.

Mr. A. S., aged 44, bridge engineer, consulted Dr. A. E. Morphy, of Lachine, P. Q., in June, 1907, for severe itching all over the body, but especially about the chest and back. On examination a very faint tinge of yellow was observed in the skin and conjunctivæ. There was no digestive disturbance but distinct loss of appetite. A few days later the jaundice deepened and the itchiness increased. There was no pain, but the patient complained of loss of strength, great lassitude and much depression of spirits. There was also constipation. On physical examination, when first seen by Dr. Morphy, no abnormal condition about the liver was discovered; everything seemed normal.

About the middle of July a smooth, rounded, painless swelling was made out in the region of the gall-bladder. This was looked upon as a distended gall-bladder. All this time there was abundant bile in the urine and the stools were colorless and very fetid, except occasionally when they had a chocolate hue.

Mr. S. was admitted under my care as a private patient in the Montreal General Hospital, July 26, 1907, the following being his history: A tall, spare man, of very fair complexion; had never been ill before in his life and had always been most athletic, being very fond of outdoor sports. He was in his usual health until May 15, 1907, when his feet began to itch at night. This itching spread all over his body and very soon (early in June) his conjunctivæ became yellowish in color and then his whole skin became jaundiced. The color deepened rapidly, and at the time this note was made his color was more yellow than it had previously been, the itching was less troublesome but he complained

* Read before the American Surgical Association, May 5, 1908.

of great depression and weakness. He never had any severe pain in the abdomen, nor headache, but complained of a sensation as if a rope was being tied about his abdomen below the costal margin accompanied by a dull ache, especially severe when he took a deep breath.

Examination showed that his lungs and heart were normal. The urine contained bile but no sugar or albumin; the bowels were constipated, stools foul and colorless. Has never had any vomiting or fever. Has lost about 35 pounds since illness commenced. Pulse slow, 58. On examination of the liver it was found to be slightly enlarged and a fulness was felt in the region of the gall-bladder, but no distinct tumor was made out.

A question arose as to the cause of this condition and it was felt that it was either due to gall-stone in the common duct or malignant disease. An exploratory operation was advised, and on July 30th the abdomen was opened by a vertical incision through the middle of the right rectus abdominal muscle. The gall-bladder was found fairly distended but no stone could be felt, nor could any nodules or enlarged glands be made out in the common duct, nor was any thickening or infiltration felt. The head of the pancreas was somewhat hard, but nothing definite was discovered, so the gall-bladder was opened and a lot of thick, dark colored bile evacuated mixed with mucus and a dark substance of the consistence of mud. A drainage-tube was left in and nothing more done. My conclusion was, from having had a somewhat similar case the previous year, that a soft secondary malignant growth was blocking the common duct below the junction of the cystic duct, but on careful examination no primary growth could be discovered anywhere. The rectum was normal and apparently all other parts also. It was a puzzling case and explanation was difficult. The tube discharged much bile and his jaundice cleared up considerably, but he continued getting weaker and was more difficult to feed.

A month after the operation his left parotid began to enlarge and soon after pus came from the left ear; a large abscess formed which was opened and discharged freely and much necrosed tissue was taken away. Another abscess formed in the submaxillary region and caused a considerable increase of his debility. He finally died on September 6, 1907, of exhaustion.

An autopsy was allowed and the following is an abstract of the findings as reported by the Pathologist of the Hospital, Dr. Duval.

Autopsy performed fourteen hours after death. In the region of the gall-bladder there is a linear scar 10 cm. in length parallel to the median line. Through the scar runs a fistulous tract which communicates with the gall-bladder and on pressure discharges bile. The inner surface of the gall-bladder appears normal. The cystic duct, opened in situ, is distorted into a shape like the letter S, apparently the result of old adhesions. The wall of the cystic duct is of normal thickness and its inner surface smooth throughout. On opening the common duct it is seen uniformly dilated to three times its normal calibre. Its wall is somewhat thinned and the rugæ of the tunica propria present a marked fenestration, due probably to long continued distention. In the lower portion of the duct there is a soft, brownish-black, fungoid mass, 2.5 cm. in length, which completely occludes the lumen of the common duct and part of Vater's diverticulum. The passageway to the duodenum, however, is patent and normal. The tumor throughout its extent is intimately attached to the duct wall and appears to have started in the tunica propria; there is no thickening of the wall. The attachment of the growth maintains an even line 2 mm. within and along the wall as indicated to the naked eye by the pigment limit. (Fig. 1.)

The tumor is confined entirely to the common duct and ampulla. Neither the pancreas nor its duct are involved in the growth. There is no similar mass found elsewhere nor were any cutaneous moles found anywhere in the body. The common duct was opened in situ over a grooved director to which on passing it down the lumen no resistence was offered, so no occlusion was detected by means of the probe. The growth was so soft that only after the duct had been laid open was the obstruction discovered. The brownish-black mass now assumed a distinct cylindrical form which bulged far over the edges of the opened duct. It was only with great difficulty it could be returned to its original place and the edges of the duct brought again into apposition.

At first it seemed as if the tumor was altered blood or inspissated bile; its true nature was discovered, however, after a more careful examination. The melanoma on closer inspection showed

FIG. 1.

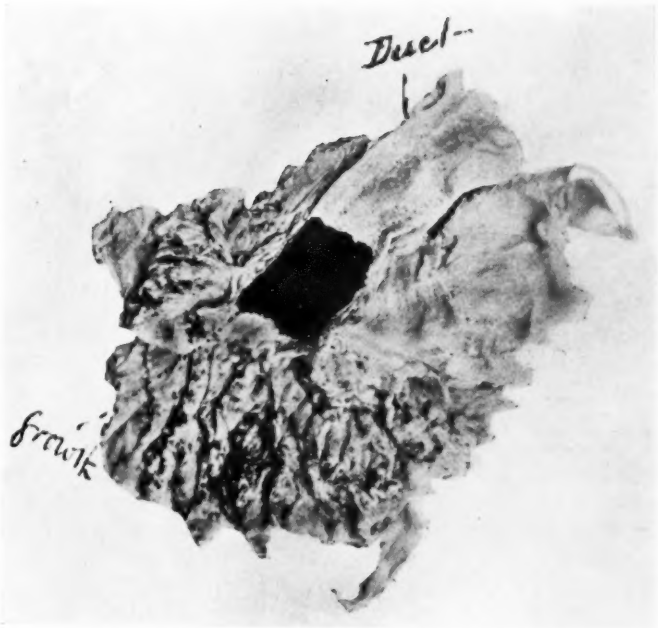
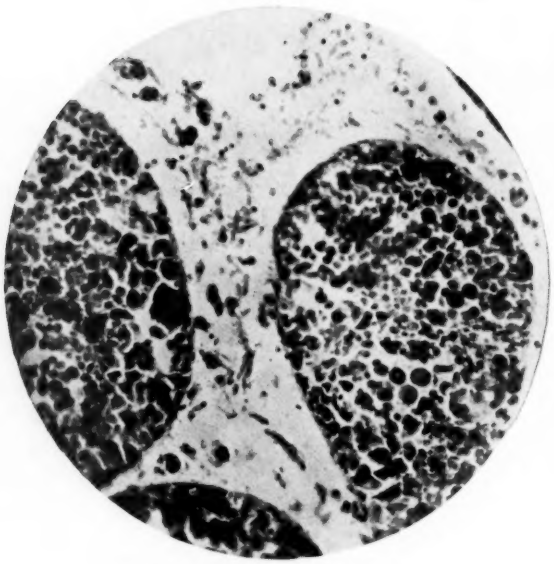


FIG 2



Section showing pigment cells.

FIG. 3.

Section showing villi.

innumerable densely arranged, flattened, finger-like projections; these floated free from one another at their distal extremities, but remained firmly attached at their base. When the mass was submerged in water the upper and lower limitations of the growth are sharply defined. The tumor with its curious villous structures resembles certain forms of vegetable algæ growing under water. It is noteworthy that no part of the mass could be washed away or the water discolored by the coloring matter of the tumor. On removing the mass from the water the villi immediately collapsed, allowing the tumor to assume again a smooth, dull, black, velvety surface.

Microscopical examination showed the growth to be composed almost entirely of pigmented cells. The pigment is most marked on the outer extremities of the villi where the alveolar structure is most pronounced. The cells have a large, distinctly lobulated vesicular nucleus with one or more nucleoli. The nucleolus is always sharply defined and may be very large, often only a narrow rim of nucleus surrounding an enormous nucleolus. When the cell contains little pigment it is small and the nucleus proportionately diminished. The pigment invariably occurs in the form of globules arranged in cell protoplasm equi-distant from one another. (Figs. 2 and 3.)

The pigment differs from that of the melano-sarcomata in that instead of the irregularly scattered masses of the latter it occurs in the form of globules evenly arranged within the cells. The distribution is so regular that it does not seem to be a by-product but rather an integral part of the cell. An occasional small vessel in the submucosa of the common bile duct in close proximity to the tumor contains pigment cells and with this exception the melanotic cells are strictly confined to the main mass. There was no metastasis found elsewhere in the body.

The region below the involved part of the duct showed a well-marked periglandular infiltration of lymphoid and plasma cells, but no pigmented cells of any description. All the gland follicles in the tunica propria above and below the growth showed a low grade of chronic peri-inflammation though other tissues were normal. The villous masses comprising the tumor are covered by a thin, though well-defined connective tissue, enveloped in whose fibrils are elongated cells arranged end to end in unbroken chain. There was no pigment either intra- or extra-cellular in this supporting tissue and in no way does it resemble melanoma.

Remarks.—The situation of this growth is unusual for a pigmented one, which is apparently primary and whose cellular structure resembles in many ways epithelioma. Secondary melanosarcomata are common in the liver, but no case has

been reported of such a secondary growth in the common bile duct. The gall-bladder and ducts are the more frequent sites for primary sarcoma. We must conclude from the absence of primary growth elsewhere that the melanotic growth arose from cells in the common bile duct.

There is a possibility that at some time there was a dislodgement of one or more pigment-bearing cells from a normal situation which subsequently became arrested at a distant point. In this way we may account for the occurrence of secondary melanoma in an internal organ where no primary tumor actually exists. Of course this theory is open to the criticism that the primary focus had escaped discovery.

EXPERIMENTS IN FLUSHING THE INTESTINAL CANAL WITH SALT SOLUTION THROUGH MULTIPLE ENTEROTOMY OPENINGS.*

A SERIES OF STUDIES ON ANIMALS AND ON HUMAN CADAVERS FOR THE PURPOSE OF DETERMINING WHETHER IT IS PRACTICABLE TO ATTEMPT TO REMOVE A PART, OR THE WHOLE, OF THE INTESTINAL CONTENTS BY WASHING OUT THE CANAL OF THE SMALL INTESTINE THROUGH ENTEROTOMY OPENINGS, SYSTEMATICALLY FROM ABOVE DOWNWARDS; AND, FINALLY, BY WASHING OUT THE COLON FROM THE LOWEST ENTEROTOMY OPENING, THE CONTENTS OF THE COLON AND WASH WATER ESCAPING FROM THE ANUS.

BY GEORGE H. MONKS, M.D.,
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For a number of years I have been much interested in what has seemed to me a useful procedure in certain conditions of the intestines; namely, the immediate removal of an appreciable portion of intestinal contents through one or more enterotomy openings. In an article read before this Association in 1903 [1] I suggested the possibility of emptying the intestines through a rigid tube upon which a considerable length of the intestines is *gathered*. Later I made further experiments upon the cadaver in reference to this procedure, and published them.[2] In many cases, as has been shown by my own experience, and that of a number of other surgeons who have kindly communicated their results to me, this procedure is quite sufficient to relieve the intestines by removing a large part of their contents.

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* Read before the American Surgical Association, May 6, 1908.

[1] Intestinal Localization. Annals of Surgery, October, 1903, p. 575.

[2] Studies in the Surgical Anatomy of the Small Intestine and its Mesentery. Annals of Surgery, October, 1905, p. 543.

Note.—These experiments were performed at the Harvard Medical School: the animal experiments in the Laboratory of Physiology, and the Laboratory of the Division of Surgery; the experiments on cadavers in the rooms belonging to the Department of Operative Surgery.

I was not aware that this procedure had ever been used by any one else until just before I presented my paper at the meeting. At that

I have long had the feeling, however, that, in certain critical cases of acute intestinal toxæmia in which the patient's life is threatened because of it, something more may be needed. It has also seemed to me that if a method could be devised by which the intestinal canal, or even a portion of it, could be cleansed by washing with warm salt solution without causing thereby fatal shock or peritonitis, a useful procedure might result—a procedure which would accord with a correct surgical principle, viz., the immediate and thorough removal of at least one of the principal causes of the patient's illness.

Now, while a straight canal, if not too long, can easily be flushed from one end to the other by a steady flow of salt solution, such a procedure in a tortuous canal like the human intestine is practically impossible. Even if this could be done, the force required to do it, and the resulting tension

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time Dr. John E. Summers, Jr., of Omaha, called my attention to an article on "Intestinal Paralysis" by Dr. George Haslam, of Fremont, Nebraska, in which article irrigation of the intestinal canal was used in several cases. The reprint of this article, which Dr. Summers kindly gave me, does not state where the article originally appeared, but a footnote says that it is "Part of paper read at the annual meeting of the Dodge County Medical Society held at Fremont, Nebraska, December 11, 1902." In some of these cases permanent openings were made and the bowel was flushed from time to time after operation; in others the intestinal wounds were sewed up and the bowel returned to the abdominal cavity. One case given at length deserves special mention. The patient was a boy, of 14 years, who was "suffering from a severe attack of intestinal paralysis accompanying a relapsing appendicitis." A loop of small intestine, about 18 inches long, and "as high as possible" was drawn through an abdominal incision. Each end of the loop was opened and the bowel washed out. The "openings were stitched to the extreme end of the incision, the intermediate portion of which was then closed with deep stitches." The stomata were used to flush out the bowels during the first few days after operation. Later the openings were closed, and the bowel replaced in the abdomen. The patient made a good recovery. Dr. Haslam recommends in such cases enterostomy openings "as high as possible" with a good length of bowel between them. He refers to an article by Dr. Edmund M. Pond of Rutland, Vt. (*American Journ. Obstet.*, 1898, p. 289). Dr. Pond's patient was a girl of 10 years, suffering with appendicitis and general suppurative peritonitis. From the description given it is evident that the patient was in a desperate condition. The abdominal cavity was thoroughly irrigated, and a distended loop of

within the intestine would be so great as probably to cause injury to the wall or attachments of the gut, or even a rupture.

While thinking over this subject it occurred to me that it might be worth while in the experiments which I purposed to make, to determine, so far as I could, whether the intestinal canal could be cleansed with comparative ease and safety, not by attempting to flush the whole bowel at once, but by flushing it section by section. It also seemed obvious to me that, to flush the intestinal canal properly, the flushing should be carried out from above downwards, or, in other words, that the irrigating fluid should be introduced into the intestinal canal through an enterotomy wound high up in the gut, and that after traversing the section of gut just below, it should be allowed to escape from a second enterotomy wound at the lower end of that section, and that later the second section of bowel should be flushed in the same way, that is, from above

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small intestine, a few feet from the ileocæcal valve, was brought into the wound, stitched to it and incised. Hot saline solution was then introduced into the bowel above and below the incision, and the bowel "thoroughly unloaded." From time to time during the next few days the bowels were irrigated through the fistula. The patient ultimately recovered. Dr. Pond was, apparently, the first surgeon to make use of irrigation of any kind for the purpose of cleansing the bowels.

Had I known of these cases earlier I should have been glad to incorporate them in my paper. As it is, however, I am obliged to place them in a footnote. It is gratifying to learn of the success which attended irrigation of the bowel in these cases of Drs. Haslam and Pond.

From the accounts given of these cases, however, I do not understand that any attempt was made to wash from above downwards, or to cleanse systematically the whole of the small intestine, or even a large part of it, and furthermore no mention whatever is made of cleansing the colon.

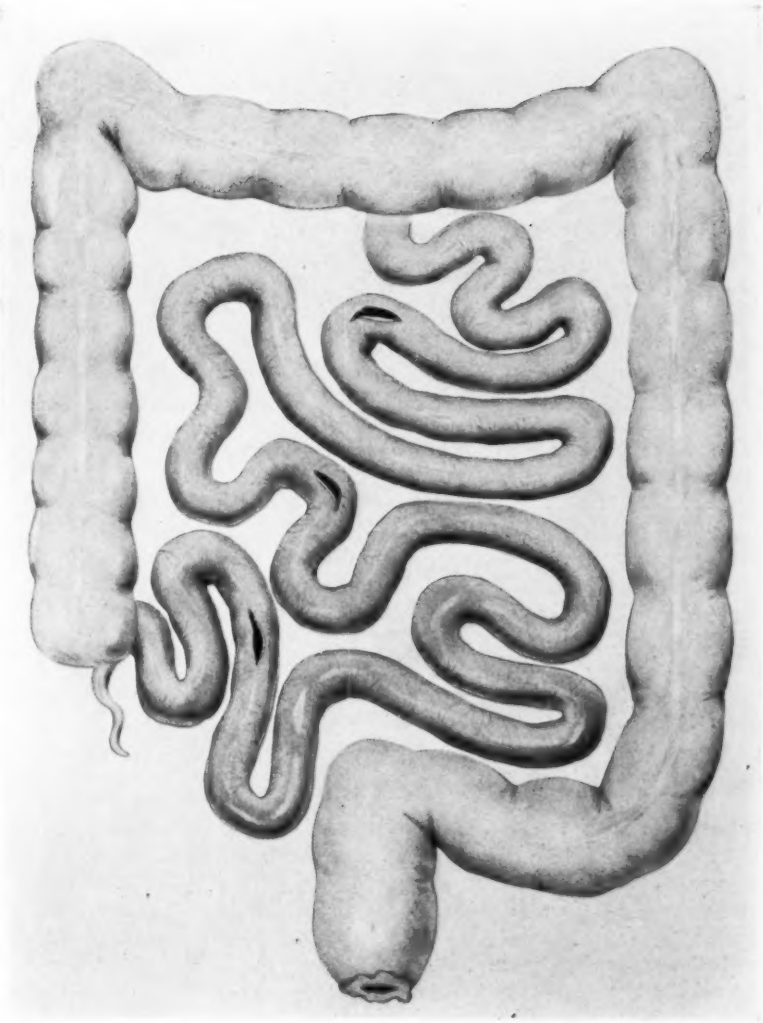
After my paper had been read at the meeting my attention was called to the following statement in Keen's Surgery, vol. iii, p. 777: "Kocher opens high in the jejunum and low in the ileum, washing the gut through and through and closing the openings at the termination of the irrigation." I have not been able, however, to find the original article, in which Kocher describes this procedure. I also fail to understand how the human intestine can be flushed from one opening high in the jejunum to another low in the ileum without causing very dangerous pressure within the gut. In a number of experiments on the cadaver I found this procedure practically impossible.

downwards. A glance at Fig. 1 will make clear this division of the small intestine into sections; the first section being between the first and second enterotomy wounds, and the second section between the second and third. This diagram is intended only to illustrate the principle on which flushing may be done. The number and position of the enterotomy wounds would naturally vary with the case.*

Now, in the human cadaver in order to cause the irrigating fluid to flow downwards in the bowel—and not upwards—it is necessary for the surgeon first to determine with certainty the *real direction* of the bowel in any loop of gut which he proposes to incise. This can be determined with certainty, provided the abdominal wound is large enough to allow palpation of the mesenteric root. For the purpose of explaining this method in detail I take the liberty of introducing Fig. 2, which has already appeared in one of the articles already referred to. A loop of intestine is gently drawn out of the wound by the surgeon. The assistant, grasping the two ends of this loop, holds it suspended vertically from the wound. The surgeon, putting his thumb on one side of the loop and his fingers on the other, causes them gently to proceed down the mesentery towards the right side of the spine,—in other words, towards the root of the mesentery. Fig. 3 shows the narrow pathway in the deeper part of the mesentery down which his thumb and fingers must proceed in order to reach the mesenteric root. If he finds a twist in the mesentery—a condition easy to detect—he withdraws his hand, and turns the loop of bowel in such a way that the twist is removed. His thumb and fingers are then pushed again down the mesentery, in the same manner as before, towards the mesenteric root. If there is then no twist in the mesentery the surgeon knows that the proximal end of

* The systematic irrigation of the intestinal canal here suggested was planned for the purpose of experiments on cadavers and on animals, in which no pathological obstruction was supposed to exist. It is, of course, obvious that no attempt should be made on a patient with mechanical obstruction to irrigate that part of the bowel in which obstruction exists, or, to do so even after the obstruction has been removed, if there is reason to believe that the wall of the gut has been weakened.

FIG 1



A diagram to illustrate a method by which the intestinal canal may be flushed. In this diagram three enterotomy wounds are shown. The number and position of the enterotomy wounds would naturally vary with the case.

FIG. 2

Showing on the cadaver the method of determining the real direction of the gut by passing the thumb down one side of the mesentery, and the fore and middle fingers down the other, in the direction of the mesenteric root. If the whole of the cadaver were shown, its head would be on the left side of the illustration.

FIG. 3.

The loop of bowel is being held upwards by the assistant. The thumb and fingers would in this case proceed to the root of the mesentery down the constricted pathway in the middle probably without encountering any twist.

the loop lies at the upper end of the wound, and the distal end of the loop at the lower end of the wound. In this simple manner he learns what is the real direction of the gut, and, therefore, the direction in which the irrigating nozzle should be placed in the bowel. Simple as it is, however, it is hardly likely that one can successfully carry out this procedure on the living subject until one has tried it—in fact, practised it—on the cadaver.

With the idea of testing, so far as I could, the practicability of flushing the canal of the bowel, section by section, I carried out during the last two years at the Harvard Medical School a series of experiments on animals and human cadavers. In all of them I was assisted by Dr. William E. Faulkner, and it gives me pleasure here to acknowledge his kind and helpful services. I beg to thank also Professors W. T. Porter and W. B. Cannon for having placed at my disposal for a part of the animal experiments the necessary laboratory facilities.

STUDIES ON ANIMALS.[3]

I carried out the procedure referred to on fifteen cats. Although the technic of the operations on these animals varied somewhat, the essential features were approximately the same in all. The anæsthetic used was ether.

The hair upon the abdomen was removed by a depilator, and the skin cleansed and sterilized. The abdomen, having been freely laid open and the coils of intestine brought outside of the abdominal wound, the gut was incised on its free border at a point near the upper end of the jejunum. A small glass

[3] My reason for beginning these experiments on animals rather than on human cadavers was principally because of the fact that the intestinal canal is much simpler and shorter in cats (the animals which I purposed to use) than in human beings, and I wished first to try the effect of this procedure (flushing the intestinal canal) under conditions which seemed most favorable before proceeding with what I knew would be (mechanically, at least) more difficult, namely, flushing the intestines of human cadavers. In connection with these experiments on cats I had also, of course, the great incidental advantage of observing the immediate and remote effects of the operation on living animals.

tube was then introduced through the enterotomy wound, and this tube, having been pushed well into the lower arm of the gut, was held or tied in position, after which the gut below the opening was gently filled with warm salt solution to a point just above the ileocæcal valve. At this point there was made another opening in the gut, and much of the salt solution which had already been injected into the gut through the upper opening was allowed, mixed as it was with intestinal contents, to escape through the lower one. More salt solution was then introduced through the upper opening, and, of course, more wash water, mixed with intestinal contents, escaped from the lower opening, or through a glass tube which had been previously inserted into it. About one pint of salt solution was thus passed through the gut, the reservoir being held from 1 to 3 feet above the body of the animal. The length of intestine between these two openings was 3 to 5 feet, according to the length of the animal's bowel. The upper intestinal wound was then sewed up, and carefully cleansed, and all of the bowel which had been flushed, except that part in which the lower intestinal wound was situated, was returned to the abdominal cavity. In a few cases the lower intestinal wound was then sewed up, and the loop of bowel cleansed and returned to the abdomen. In the other cases—the most recent ones—the colon also was flushed from the lower intestinal wound through to the anus. This was accomplished by inserting the glass tube, directed downwards, into the lower enterotomy opening, and allowing warm salt solution gradually to flow into and distend the colon. After this an exit tube was inserted into the anus, and the bottle held a little higher. The result was that the wash water, mixed with fecal material, finally ran out through the anal tube. This washing was continued until the salt solution came away clear. The second enterotomy wound was then sewed up and the abdomen closed without drainage. Naturally, much of the fluid which had been injected into the bowels still remained there.

It is hardly necessary to say that in all of these cases the

greatest care was taken to avoid contamination of the peritoneum by the intestinal contents. During the manipulations those parts of the bowel in which were situated the enterotomy openings were drawn well towards the operator, and from the time when the first incision was made until the suturing was complete they were kept carefully isolated from the other parts, partly by gauze, but in the latter cases by means of superimposed sheets of rubber dam.

This method of using rubber dam proved so useful to me in these experiments that I give it here in detail. It seems to me not unlikely that it may be of practical value during operations on the human subject; in fact I have myself used it, with advantage, in a number of abdominal operations.

A piece of thin sheet rubber about one foot square,—on the human subject it should be 18 inches square,—properly sterilized, and moistened, with a small slit made at or near its centre, was laid over the laparotomy sheet in such position as to bring the slit in the rubber dam directly over the abdominal wound. The small intestines were then gently lifted out through the abdominal wound, and made to rest upon the rubber dam. Another sheet of rubber dam, also sterilized and moist, was then laid over them. Two little slits were then cut in this second rubber dam, and through them were gently drawn the two loops of intestine—naturally one belonged to the upper part of the gut and the other to its lower part—in which were to be made the two enterotomy openings. Though most of the intestinal coils were outside of the abdominal cavity, nevertheless, they lay between two sheets of rubber dam where they were kept moist and warm, and protected from injury and infection.

Of the fifteen cats operated on five died and ten lived. *Cat No. 1* died four weeks after the operation, but no definite cause for death could be found at the autopsy. The wounds in the intestine were solidly healed and there was no sign of peritonitis. *Cat No. 4* died eleven days after the operation. At the autopsy the upper wound in the intestines was found firmly healed. The lower wound, however, was in the middle

of a large suppurating area (*peritonitis*) in which several coils of intestine were included. The stitches in the enterotomy wound had evidently given way, for the wound was open, thus permitting the escape of intestinal contents into the peritoneal cavity. *Cat No. 6* died three weeks and one day after the operation. The autopsy showed that the cause of death was *peritonitis,* and both wounds were open. It is likely that the peritonitis was due largely, if not wholly, to the fact that, intentionally, no attempt had been made in this case to approximate the serous surfaces of the bowel, the intestinal wounds having been united by a simple over-and-over suture. The method was used here for the reason that it had been successfully tried in the preceding case. The two other fatal cases were *Cats No. 10* and *No. 12.* Both of these animals died during operation—presumably from ether. Of the five cats, then, which died, the cause of death in two was presumably etherization; in one it was not discovered, while in the other two it was peritonitis resulting probably from technical errors, which had no necessary connection with the principle under investigation. None of the three cats which survived the operation was at any time after it in good condition. All three were evidently very sick, and from the time of the operation they took little or nothing in the way of food.

On the other hand, the ten cats which survived seemed to regain their former condition of health and activity within one to three days after operation, and they ate their usual amount of food.

Autopsies were done on these ten cats at the following times after operation: at 6 days (2 cats); at 8 days (1 cat); at 13 days (1 cat); at 18 days (1 cat); at 21 days (1 cat); at 26 days (1 cat); at 32 days (1 cat); at 33 days (1 cat); and at 35 days (1 cat). The animals were killed by etherization or by the use of gas, before these examinations were made.

Barring the fact that in a few cases the abdominal wound did not heal by first intention throughout, nothing pathological

was discovered at any of these autopsies, and the condition of the abdominal contents was quite normal except for the presence of the firmly healed intestinal wounds, and a few adhesions. The intestinal sutures (iron-dyed silk), partly disintegrated, were in some of the cases in the process of being thrown off from the wounds into the lumen of the gut.

From these experiments one is, I think, justified in stating (1) that it is mechanically possible, from an abdominal wound in a cat, to flush with salt solution the greater part of the small intestine through an opening in the upper part of the jejunum, to a second opening in the lower part of the ileum, and then to flush the large intestine from this second opening, the intestinal contents and wash water escaping through a tube previously inserted through the anus into the rectum; (2) that it is possible to do this in the majority of cases, if not in all of them, without causing sufficient shock to kill the animal; (3) that it is possible to do this without peritonitis resulting, provided, of course, that the operative technic is without error; (4) and, that it is probable the animal will regain, in the usual time after an abdominal operation, its former condition of health and activity.

STUDIES ON CADAVERS.

I next tried to flush the intestinal canal of human cadavers with the same technic I had used in the cats, but I soon found, as I had expected, that the problem in the human body is a much more complicated one. While in a cat the small intestine is short, of small calibre, thick-walled, and comparatively simple in the disposition of its coils, that of the human being is very long, of large calibre, thin-walled, and very complicated in its arrangement.

With the abdomen of the cadaver wide open I attempted to flush the intestines, by sections, from the upper part of the jejunum down. On the whole, this attempt was successful, though I found that, in order to do it satisfactorily, more openings in the intestine were required than were necessary in the animal experiments. The great length of the intestine,

the complicated arrangement of its coils, and the occasional presence of masses of solid or semisolid feces in the colon presented obstacles to the onward flow of the water, though a gentle manipulation of the distended coils usually sufficed to remove the obstruction, and to allow the fluid to proceed down the intestinal canal. The technic was essentially as follows:

The abdomen having been freely laid open from ensiform cartilage to pubes, the presenting intestinal loops were lifted out of the abdominal cavity, and an incision was made into the jejunum as high up as possible. A large glass tube was tied into the opening thus made, and water, gradually introduced through the tube, was allowed fully to distend as much of the intestine below the opening as possible. After this the intestine was opened lower down and another tube—this one for exit—was tied in place. The portion of intestine to be cleaned was isolated from the rest of the bowel either by clamps, or by the ligatures used for holding the tube in place, or by hand pressure. The fluid which entered the intestine through the upper tube, coursed down the intestinal canal, and came out through the lower tube, carrying with it most of the intestinal contents. When the wash water was clear, the upper tube was removed, and the intestinal wound sewed up. The second segment of intestine was then flushed in the same way as the first one, the exit tube for the first segment of bowel being replaced, and used for the *flushing tube* of the second.

This process of irrigating the small intestine, section by section, and sewing up the enterotomy wounds when they were no longer needed, was continued until nearly the whole of the small intestine had been flushed, and its contents largely removed. It was necessary to make at least three openings in the gut—sometimes four or five—in order to wash out the gut in its whole length. From the lowest enterotomy opening the attempt was then made to flush the rest of the small intestine and the colon. As a rule this was successful, though, as I have already said, the presence in the colon of solid or semisolid feces sometimes made this process difficult. Finally the

last enterotomy opening was sewed up, and the abdomen closed.

In order to determine whether a change of posture would make any difference with the ease with which the intestines could be washed out, I tried several of these washing experiments, with the cadaver in different positions. While the distended loops of an inverted cadaver—the intestines hanging from the open abdominal wound—could be washed out rather more easily than those of a cadaver lying on its back, the difference was not especially marked. The other positions tried, viz.: elevated head, elevated feet, one side or the other uppermost, etc., showed no appreciable difference in the ease of flushing the bowel.

As a result of these, and many other similar experiments in flushing the intestinal canal of human cadavers I reached the following conclusions:

1. That it is possible in most cadavers to flush the entire intestinal canal, *by sections,* from the upper part of the jejunum through to the anus, provided that the abdomen is freely laid open from ensiform cartilage to pubes, and also provided that, as already explained, there are made in the intestine a sufficient number of openings.

2. That it is possible in most cadavers, through an incision from umbilicus to pubes, to flush either the lower part of the small intestine only, or the lower part of the small intestine, and the colon in addition.

After I had conducted a number of these experiments on animals and cadavers it seemed to me that gently to flush the intestinal canal of a patient suffering with acute intestinal toxæmia, was a practicable procedure, and that, after the simpler methods had been used without result, it was a thoroughly justifiable one. It also seemed obvious that, after the escape of intestinal contents which would naturally take place through the enterotomy wounds—especially when a long evacuating tube is used,—a careful washing of the intestinal canal with warm salt solution would be of great advantage to such a patient, especially for the following reasons: first,

because it would cleanse a region which was the source of poisonous infection; secondly, because it would leave within the intestinal canal a large quantity of salt solution where it would be absorbed into the circulation, and thus improve the pulse; thirdly, because the warmth of the solution left in the bowel would probably help to resist shock. For these reasons I felt willing to carry out this procedure on a patient, provided the conditions which the patient presented seemed to me to justify it.

CASE.

Finally a case, for which the treatment outlined above, or some modification of it, seemed especially suitable, entered my service at the Boston City Hospital. This case has already been published in full,[4] but as some reference to it seems to be called for in connection with the experiments which led up to it, I give here a brief abstract.

The patient was a little girl eight years old, whose condition (the result of streptococcus peritonitis and probably also intestinal toxæmia) was deplorable. The case was one of a class that surgeons dread to see. She presented the symptoms of an extreme degree of septicæmia, or toxæmia, and a fatal result within a few hours seemed inevitable. A median incision from umbilicus to pubes opened the abdominal cavity. There was free pus everywhere, and to the reddened intestines many thick yellowish flakes of fibrin were adherent. Exploration showed no obvious cause of peritonitis, though, as the appendix was somewhat swollen and injected, it was removed. The peritoneal cavity was thoroughly irrigated through a glass tube. A loop of intestine near the upper end of the wound[5] was drawn out and the real direction of the intestine comprising it determined.

An incision was then made in this loop, and a long glass tube, with its tip directed downwards, was introduced into the bowel through the intestinal wound. During this process much

[4] Boston Medical and Surgical Journal, June 20, 1907, p. 809.

[5] By an oversight in the original report of this case the impression was given that this loop was near the duodenum, whereas it was, in truth, probably in the lower half of the intestine.

gas and a small amount of intestinal contents were removed. A gauze pad held by the hand firmly around the intestine kept the tube in place and prevented leakage. Warm salt solution was then allowed gradually to flow into and distend the intestinal canal, and a second enterotomy opening was made in the lowest intestinal loop which presented in the wound. Much foul-smelling gas and intestinal contents escaped from this second opening, but finally the wash water came out clear. The upper wound was then stitched up, and the tube was inserted into the lower wound, with its tip directed downwards. A large amount of salt solution was introduced which fully distended the rest of the small intestine and colon, and the lower wound was then stitched up. The peritoneal cavity was again irrigated, a small drain placed in the pelvis, and the abdomen closed. The greatest care was taken during the operation to avoid contamination of the peritoneum. After the dressing had been placed on the wound a rectal tube was introduced, and nearly a quart and a half of fluid, containing much fecal material, removed through it.

The change in the patient's pulse during the operation was so marked as to call for special mention. While before the operation it was "thready" and registered 180 beats to the minute, it became much stronger during the flushing of the intestine and dropped to 140. The patient's general condition was correspondingly improved. On being put back to bed, she soon rallied from the effects of the operation, and finally got well.

REMARKS.

As a result of the experiments described, and also because of the recovery of the patient in the case just referred to, I am strongly inclined to the belief that the procedure has in certain cases, a distinct sphere of usefulness.

It seems to me that when a patient's life is in danger because of acute intestinal poisoning, associated with great distention of the bowels, and the time has passed when the ordinary methods seem likely to be of use, when the temperature is high and the pulse rapid and weak, there is in such a case a fair possibility that the immediate removal through enterotomy openings of a part of the intestinal contents, and flushing the gut with a quantity of warm salt solution, from

one opening to another, may, at this critical period in his illness, turn the scale in favor of the patient, and thus save his life. I have suggested carrying out this procedure through multiple openings in the intestine for the reason that, in my opinion, it can be done more thoroughly in this manner. It is, of course, possible that even if done through only one opening the procedure may still be sufficient to be of material assistance to the patient. Apparently, the coexistence of peritonitis does not contraindicate the procedure.

It is quite possible that for various reasons the technic of this procedure is easier in a child than in an adult. However, I see no reason to prevent its performance in the adult, at least in part, provided great care is taken. Care must also be taken, as already mentioned, in cases in which there is, or has been, a mechanical obstruction of the bowel, or in which for any cause its walls are greatly weakened.

As for the technic of the procedure of flushing the intestinal canal I venture to make the following suggestions:

1. Make a free opening through the abdominal wall in the median line, the incision reaching from the pubes to, or above, the umbilicus.

2. Pick up a loop of bowel high up in the wound.

3. Determine by reference to the root of the mesentery which is really the upper and which the lower end of this loop. This determination is essential, if one wishes to know in which direction the salt solution will flow during the process of flushing.

4. Make an enterotomy wound in the loop. Allow gas and feces to escape, and insert the tube into that arm of the loop which leads in the direction of the ileocæcal valve: in other words insert the tube pointed downwards into the gut.

5. Allow warm salt solution gradually to distend a few of the loops below this opening. If nothing more than this is done in the way of washing, it seems to me that the substitution in the bowel of the warm salt solution in place of the gas and feces that have escaped, will presumably help the patient.

6. If the patient's condition will allow it, pick up the

loop which is apparently the lowest of those distended, make a second opening, insert a second tube—this one directed upwards—and allow the wash water to run out through the tube until it becomes clear.

7. Carefully cleanse and sew up the first enterotomy wound, and return to the abdomen that part of the bowel which has been washed out. In fact, as soon as any enterotomy wound is no longer needed it should be cleansed, and sewed up, and the loop of bowel which has been sutured should be returned to the abdominal cavity.

8. Repeat this procedure as many times, consistent with safety, as may seem necessary, each time isolating and cleansing a segment of intestine lower down.

9. Finally, if the patient's condition will permit further operating, fill the colon with salt solution from the lowest enterotomy opening, and insert a rectal tube to remove any wash water or intestinal contents which may reach the rectum. It is well to insert the rectal tube before attempting to close the abdominal wound, and thus make it easier, by removing some of the wash water in the colon, and diminishing its size, to bring together the edges of the wound.

10. Use great gentleness in all manipulations, and carefully avoid contamination of the peritoneum. The method already described of protecting the intestines between two layers of rubber dam bids fair to be of real service.

11. In the event that peritonitis is also present, the peritoneal cavity should be washed out thoroughly, *before* flushing the intestinal canal, and also *after* it.

In closing, I wish to repeat that I do not consider flushing the intestinal canal to be a substitute, in all cases, for tubage of the intestine, or even for ordinary enterostomy. Flushing would seem to be called for only in the most desperate cases—fortunately occurring less frequently, as time goes on—in which the bowels are greatly distended, and in which the patient, overwhelmed as he is with septic or toxic products, will die unless immediate relief is afforded.

PRIMARY CARCINOMA AND SARCOMA OF THE APPENDIX VERMIFORMIS.*

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PRIMARY carcinoma of the appendix has been a subject which has interested both surgeons and pathologists for many years. A great deal of work has been done on this subject both by pathologists and surgeons, although it has been regarded by many as a very rare condition and by some, rather as a surgical curiosity. In looking over the literature, we find that the first case where malignancy of the appendix was recognized was by Merling[39] as far back as 1838. Since that time many cases have been collected, and in analyzing these cases we find that many of those reported are very imperfectly described and cannot be put down as primary cases of carcinoma involving the appendix, as many of them have their origin in the cæcum or else are the result of metastasis from other portions of the infected abdominal viscera. It is interesting to note that in a majority of the cases analyzed we find that most of them are reported by American authors. The great majority of these cases had some acute or chronic inflammatory lesion which was responsible for the symptoms demanding operation. Some few of them were found, however, in autopsies as the result of routine examination of the appendix.

As to the frequency of malignant disease of the appendix, nobody can deny that this condition is becoming more frequently recognized as the result of more systematic and careful examination of all appendices removed, as is shown by the number of cases collected and reported from the Bender Laboratory in Albany. There is little doubt that many cases of malignancy were overlooked, in which it was sup-

* Read before the American Surgical Association, May 5, 1908.

posed that a macroscopical examination was all that was necessary to demonstrate whether an appendix was slightly inflamed, or whether it was the seat of a neoplasm.

In response to a letter which was sent to the Fellows of this Association, asking for a report of cases of malignant disease of the appendix occurring in their practices, a large number of answers were received, many of the Fellows stating that they had had no experience with this condition. In some of the cases received the diagnosis was not entirely borne out by microscopical examination, and we were therefore forced to exclude them from our list. We were successful, however, in collecting 9 cases which had not been previously reported. In 1902 the author reported two cases at the Albany Meeting of this Association, in which the diagnosis was verified by a thorough microscopical examination. One of these cases is in perfect health to-day, but the other patient has been lost sight of. Since that time three other cases have occurred in our practice; in two of them the condition was found as the result of routine operation for appendicitis; in the other, a patient of Dr. Meigs, a neoplasm was found at autopsy, the patient having died of lobar pneumonia at the Pennsylvania Hospital.

We have collected from various sources 92 cases of primary carcinoma of the appendix; to this number may be added 9 cases collected by the author, the most of which have occurred in the practices of the Fellows of this Association. It will, therefore, very readily be seen that the condition ceases to be a rarity.

Zaaijer [64] mentions that 18 cases of carcinoma were collected from a total of 2322 autopsies for appendicitis; we think it probable, however, that this number is too small, as in many of these 2322 cases the appendices were not examined microscopically. If this procedure is not carefully carried out many cases will be lost: in one of our own cases the detection of malignancy was recognized only after several sections had been cut through different portions of the appendix.

Baldauf [1] states that about 1 per cent. of all inflamed appendices removed will be found to be malignant to a more or less degree. This malignancy depends for its severity in

a great measure upon the time of life in which it is detected. For instance, carcinomas of the so-called basal celled variety, as described by Warthin,[59] arising in young subjects, seem to be much less malignant. Baldauf's percentage appears large when compared with the results of older observers, but this difference is attributed by some to the more accurate methods of examination now being employed. Kelly[28] explains it by the fact that carcinoma of the appendix often causes perforation or gangrenous inflammation in its early stages. But there appears to be another factor at work:—If appendicitis is the cause of appendiceal carcinoma, an increase in the former will cause an increase in the latter, and vice versa. An increase in the frequency of carcinoma of the appendix will be an important argument in favor of assuming an increase in appendicitis.

The question of carcinoma of the appendix must be investigated from both an anatomical and a clinical side. We find that in nearly all the collected cases the operation was performed for the relief of symptoms of appendicitis of either an acute or chronic variety. The condition of the appendix was found on careful microscopical examination. In many instances the inflammation had lasted for a period of years, and in some instances it would seem that the inflammation antedated the cancer. A point worthy of attention is that few cases of carcinoma of the appendix have occurred where there was an acute inflammation, but when this has occurred it has in all probability been an acute attack grafted on an old case of chronic inflammation of the appendix. That chronic inflammation plays a very important part in carcinoma of the appendix is shown by the fact that a large percentage of the tumors were found in the tip of the appendix which had previously been obliterated by chronic inflammation. Some tumors were detected throughout the organ, and a few were found in a totally obliterated appendix.

These facts therefore go far to prove that this neoplasm has a strong predilection for developing in the seat of a previously chronically inflamed appendix.

The age of the patient in which we find appendiceal

carcinoma is of no little interest. If we tabulate those cases in our list we have:

Under 10 years of age	4
From 10 to 20 years of age	13
" 20 " 30 " " "	34
" 30 " 40 " " "	21
" 40 " 50 " " "	7
" 50 " 60 " " "	4
" 60 " 70 " " "	2
" 70 " 80 " " "	2
" 80 " 90 " " "	1
Age not stated	4
Total	92

(Average age of all cases was 29 years.)

Of this number 41 were males, 59 were females, and in 9 the sex was not stated. Age not mentioned in 4 cases, of which 2 were males, and 1 was a female.

We have also been able to collect 6 cases of sarcoma of the appendix, of which 4 were males and 2 females. The respective ages of these patients were 45, 39, 27, 55, and in 2 cases the age was not stated.

The question may naturally arise, why does the age of malignancy in the appendix differ so greatly from the age at which malignant disease is found in other organs of the body, but this can be answered by the fact that a large percentage of all carcinomatous appendices are found as a result of operations for appendicitis, and most operations of this character are done between the ages of ten and forty years. Therefore, the above deduction cannot be said to be true, but is simply applicable to the usual age at which operations for appendicitis are performed.

The tumors, although almost always very small, vary greatly in size,—from microscopical size to the size of a normal ovary. As we know little about the early stages of intestinal cancers, it may be that similar cancers can be found in other parts of the intestine in young individuals; if so they are usually overlooked at autopsies, and we might therefore say that very small cancers of the appendix make their appearance

from ten to thirty years earlier than the large evident intestinal tumors presenting clinical symptoms.

The appendiceal tumors will give rise to symptoms apart from those accompanying appendicitis only when the growth has extended to the surrounding tissues, invading the cæcum and becoming a carcinoma of this organ, for by this time the appendix has lost nearly all its characteristics and is hardly recognizable as the primary seat of the growth. We are of the opinion that these cæcal cancers originating in the appendix are apt to occur later in life, usually between 40 and 60 years, and have a marked tendency to metastasis and recurrence. Many writers concede the appendiceal origin of cæcal cancers, believing them to spring from some cancer-nest in an old, chronically inflamed appendix, after the patient has reached the age of 40 to 60 years. So obscure is this subject that light can be thrown upon it only by the fundamental revision of cæcal carcinomas, and by the careful study of all future cases.

Our experience with recurrence of the disease in the cæcum after removal of the appendix for carcinoma has been very limited, but there is no doubt that in a certain number of cases the condition does recur in the cæcum.

It would seem probable that the cases of primary malignancy of the appendix so far reported fall into two classes—first, the columnar-cell type, as found in the stomach, intestine, and other parts of the alimentary tract, and second, the spheroidal-cell type which closely resembles the basal-cell carcinoma of the skin. In this latter class Rolleston and Jones [52] would place the great majority of primary cases of appendiceal carcinoma, and we think it probable that many cases described as endothelioma and sarcoma are in reality this type of carcinoma. Warthin is of the opinion that the vast majority of reported cases of malignant tumors of the appendix are to be classed as basal-cell carcinomas. This theory would seem also to be borne out by the age incident: the average age of 14 cases described as spheroidal-cell carcinomas was 24 years, while the average age of the cases described as columnar-cell carcinomas was about 50 years, which more nearly corresponds

to the average age at which primary carcinoma of the intestine occurs. We may therefore consider that basal-cell carcinoma of the appendix is a disease occurring in early adult life, the earliest observed case being about 7 years of age, reported by Oberndorfer.[45] The basal-cell type is characterized by its relatively slight malignancy, and it does not tend to set up metastases or to recur after operation. In cases of columnar-cell type the prognosis is not favorable. This fact is only another evidence of the importance of basing the ultimate diagnosis and prognosis upon the precise histological study of the neoplasm.

Rolleston and Jones in a number of cases removed the appendix during life, but the nature of the disease had not been suspected in any case prior to operation. In three of their cases a portion of the cæcum at the base of the appendix was removed, and in two cases a more radical operation was necessary. Recovery is definitely stated to have occurred in the majority of the cases.

Zaaijer [64] believes that the difference in the age at which the principal types of carcinoma occur in the appendix is so small that one cannot say that any one type of carcinoma is more apt to occur at any stated age than is another type, but we think an exception may be taken to this statement in the occurrence of the so-called basal-cell type, which, as has already been stated, has been found most frequently in young subjects.

The principal mass of the tumor is generally to be found located in the mucosa and the submucosa and in the central connective tissues which replace these layers in obliterative appendicitis.

After a careful consideration of the collected cases we agree with Ribbert's [49] theory regarding the histogenesis of carcinoma of the appendix, *e.g.*, that the tumors develop from epithelial nests which have been loosened from their attachments and which find the chief cause of their detachment in the chronic connective tissue inflammation. It is difficult to determine the starting point of many of these small tumors, but it would appear that the disease starts in the mucosa, which

becomes replaced by spheroidal-cell growths from the Lieberkuhn crypts.

After having considered in a measure some of the clinical and pathological signs of cancer of the appendix are we able to build any hypothesis which will assist us in making a positive diagnosis of cancer of the appendix via other than the classical signs of appendicitis, such as pain, with which it is so closely associated? Let us, therefore, consider the classical signs of appendicitis, namely, pain, tenderness, presence or absence of a mass, rigidity, temperature, pulse, blood, history of previous attacks, age, sex and the question of heredity.

Pain in the region of the appendix is so common in all intraperitoneal irregularities that no dependence can be placed upon this symptom beyond indicating an inflamed appendix.

Tenderness and pain go hand in hand so often in all forms of appendicitis that it is of little diagnostic value.

The *presence of a mass* can be determined only if the disease has invaded the cæcum, and often from this sign, in the absence of any acute inflammatory action, the diagnosis of malignancy can be made. In one of my cases however the appendiceal tumor was as large as an ovary, and yet nothing could be palpated, simply because the neoplasm was floating loosely, attached to a long appendix and meso-appendix. The author feels very skeptical with regard to the asserted ability of some surgeons to palpate appendices which on opening the abdomen were only located after a long and diligent search.

Rigidity will be noticed only in proportion to the amount of pain that is experienced or irritation caused, especially when the abdomen is palpated, and this rigidity is simply an attempt on the part of the muscles to protect the inflamed and irritated appendix from injury. It is always seen where there is any intraperitoneal irritation, arising from any source.

Temperature.—It is questionable if any deductions other than an inflammatory condition, can be drawn from this symptom. Moschcowitz mentions a curious temperature rise in one of his cases, but this appeared to be dependent upon some autointoxication entirely foreign to the appendix.

Pulse.—It would be impossible to expect to draw any deductions from this source beyond a distinct rise in the temperature or an acute inflammatory condition.

Blood.—If the disease in question has advanced and is causing much local irritation, a distinct leucocytosis might be expected. On the other hand, in microscopical cases I question if any data can be gathered from the most elaborate study of the blood picture.

The *history of previous attacks* is important, bearing considerable relation to both the symptoms and the prognosis. It appears that nearly, if not all, cases of cancer of the appendix have been ushered in by attacks which were supposed to have been appendiceal, but it is only after the removal of the appendix that the exact condition reveals itself. It generally shows that the carcinoma has selected for its site a previously chronically inflamed appendix. This view has been strengthened by the observations of Letulle and Weinberg and was undoubtedly true in the four cases upon which the author has operated. Patients are apt to be so inaccurate in their statements with regard to former attacks of appendicitis, confusing the symptoms with those of cold, indigestion or slight abdominal cramp, that deductions placed upon such information are of practically no value. Moschcowitz, in analyzing a number of cases, states that 66 per cent. of carcinomas were preceded by acute inflammatory symptoms. The symptoms in some few cases may be caused by a small neoplasm impinging on the lumen of the appendix, causing a stenosis which will cause symptoms of appendicitis. I am strongly of the opinion that in the appendix, as in other portions of the body, malignancy tends to develop in previously chronically inflamed and irritated areas, and consider this a strong argument for the removal of all offending or troublesome appendices.

The question of the *age of the patient* has already been spoken of at some length. Most of the collected cases of carcinoma of the appendix have been procured from operative statistics, the operations being, as a rule, performed on patients between the ages of five and forty years. The natural conclusion, therefore, would be that carcinoma develops in

appendices most frequently at the time of life in which the acute inflammation of the appendix is most common, but this is simply because the condition is disclosed at operation.

The sex of the patient noted in the appended table was given in 100 instances; of these 41 were males and 59 females. The anatomical relations in both sexes are identical, with the exception of an occasional appendiculo-ovarian ligament. Nevertheless, the greater frequency of the condition in the female is worthy of note.

In cancerous diseases *heredity* is a factor which must not be lost sight of, especially where the examination of a patient who has passed into the cancer zone is concerned. The author's last patient operated upon was 41 years of age, and at the time of his operation his mother was suffering from an advanced scirrhus of the breast, from which she subsequently died.

After carefully considering the various signs, symptoms, and pathological data relative to primary cancer of the appendix, we arrive at the following conclusions:

1. Primary carcinoma of the appendix is present in from ⅓ of 1 per cent. to 1 per cent. of all cases operated upon for chronic appendicitis. But few cases are collected at autopsy.

2. Institutions which make a thorough microscopical examination of all appendices removed at operation and at autopsy will report a larger percentage of cases of carcinoma of the appendix.

3. Carcinoma of the appendix, especially of the basal- or spheroidal-cell type, is a condition of early life, occurring generally between the age of 10 and 40. There is little tendency to metastasis and the origin of the disease is, as a rule, in the mucosa.

4. The disease appears to be slightly more frequent in females than in males.

5. Acute and chronic inflammations are present and are responsible for the symptoms demanding operation. The growth, while localized, gives no pathognomonic symptoms.

6. The fact that primary carcinoma of the appendix

takes its origin in an inflammatory process forms a very strong argument for the removal of all appendices which show evidence of any irritation.

The histories of the unreported cases which the author has been able to collect are as follows:

CASE I.—G., man, aged 30. Carcinoma of the appendix was discovered at autopsy after death from lobar pneumonia. Patient of Dr. Arthur V. Meigs at the Pennsylvania Hospital. Admitted 1–21–'04. Died 1–23–'04. Family history negative. Had rheumatic fever at thirteen and has had quinsy several times and pleurodynia once. Caught cold on the 17th ult. and developed typical attack of pneumonia. Physical examination on admission, negative except as to pulmonary condition. Patient was wildly delirious before death. Temperature averaged 104° F. There were no symptoms pointing toward the appendiceal condition.

Autopsy No. 513. Ayer Clinical Laboratory.—Anatomical diagnosis: Acute lobar pneumonia, double acute fibrinopurulent pleurisy, fibrinopurulent pericarditis, congestion and œdema of the lungs, acute splenic tumor, cloudy swelling of kidneys and liver, primary adenocarcinoma of appendix. There were no evidences of metastasis. The appendix measures six cm. in length and lies behind the cæcum pointing downwards. There are no adhesions. The appendix ends in a bulbous, whitish tip which curls around much as a snail shell and is slightly adherent to itself at the distal part only. This bulbous end measures about two cm. in diameter. The thickening and enlargement occurs very suddenly, and measures about five cm. in length. The curled tip shows many injected vessels over its surface and a few minute, pinhead-sized nodules.

On section through the curled tip, what represents the lumen appears as a solid, round, regular, well-defined mass, seven mm. in diameter. It is streaked yellow and gray and bulges considerably.

Microscopical Examination.—Sections through the bulbous tip: The entire central portion of the appendix is filled with an adenomatous growth. The gland spaces are separated by delicate connective tissue trabeculæ. Some of the spaces are lined by one or several layers of columnar or cuboidal epithelium, usually separated from the wall. Others are almost filled with loose epithelial cells. Surrounding this are the muscular tissues, which are infiltrated with narrow strands and groups of cells like those in the mucosæ.

CASE II.—Personal communication from DR. C. H. MONKS.—X. Y., age 24, a strong well-built woman, who had previously been troubled more or less with indigestion for an indefinite period, entered the Boston City Hospital in September, 1902,

with symptoms of appendicitis, from which she had suffered for two days. This illness began with pain which was more or less general over the abdomen; later becoming limited to the lower half. No vomiting, and bowels were easily controlled with enemata. The general condition of the patient on admission was good and pain was not severe. Temperature, 100.5; pulse, 100. No spasm of abdominal muscles; moderate tenderness in region just below and to the right of umbilicus and also in corresponding region in left side. The diagnosis of chronic appendicitis was made and the appendix was removed a few days later and externally presented the appearance of chronic inflammation.

Pathological Examination: Appendix 5 cm. long. Mesentery adherent with some fat. Surface reddened. Small dilated blood vessels easily seen. Mucous membrane grayish and gelatinous. Yellowish nodule 0.6 cm. in diameter found 1.5 cm. from distal end.

Microscopical Examination: Slight infiltration of muscularis under submucosa with lymphoid cells. At site of tumor the mucosa is entirely replaced by a mass composed of connective tissue surrounding collections of epithelial cells.

Diagnosis: Adenocarcinoma; chronic appendicitis.

The patient made an uneventful recovery from the operation and was discharged twenty-four days later.

Five and one half years after the operation the patient was thoroughly examined and no evidence whatever of recurrence was seen and she was enjoying the best of health.

CASE III.—Personal communication from DR. JOHN C. MUNRO.—J. F. F., aged 47; Irish laborer. Admitted April 3, 1906. Discharged April 30, 1906. Family history negative. Previous history: Two weeks before operation he had an acute attack of general abdominal pain localizing in appendiceal region and accompanied by nausea and vomiting. Pain and tenderness subsided gradually in three days, but there has been an exacerbation of these symptoms about every other day since attack began. Lost seven pounds and had no appetite.

Physical examination: Well-developed and nourished; has non-movable mass the size of tennis ball in right iliac region; there is tenderness but no spasm.

Operation: Operation by Dr. Bottomley April 4. Rectus incision, rather higher than usual, over mass. Very hard irregular mass to outer side of cæcum to which it was slightly adherent.

Appendix removed by peeling out mucous and submucous coats. That the tumor was malignant was not realized until the pathological report was received a few days later. Cigarette drain placed and wound partly closed as there was some oozing. There was a purulent discharge for a few days, but recovery was uneventful.

Microscopical examination of the appendix shows it to be infiltrated with carcinoma of a cylindrical-cell type.

A secondary operation was urged as soon as the nature of the lesion was known but patient refused. Patient was examined March, 1908, and no evidence of metastasis could be found. Patient seemed in perfect health.

CASE IV.—Personal communication from DR. A. T. CABOT.—Miss P., aged thirty years. Operation, 1907. Had symptoms referable to appendix, and operation for removal showed appendix to be twisted.

Microscopical Examination: The specimen consists of a very much curled up appendix, bound down by adhesions. The epithelium of the glands of the mucosa has undergone a very curious atypical growth which in places presents the histological picture of a carcinoma but lacks the infiltrating character of such a growth. There is a large amount of chronic inflammatory tissue present.

This operation was not followed by as complete a recovery to comfort as was to have been expected, and when this condition described by Dr. Wright was known I remembered that I felt a little nodule down, seemingly, on the wall of the pelvis, which at the appendix operation I could not bring into view, and which I thought was simply a little fibroid. On January 14, 1898, I again operated. At that time the patient was in better weight, and had been having better digestion; looked distinctly better than when I had seen her in May. Examination under ether showed the right ovary fixed on the side of the pelvis and enlarged; although not greatly so. Upon opening the abdomen I found the ovary as it had been felt by examination, and close above it was a little hard mass which was situated in the side of the Fallopian tube. The ovary and the whole Fallopian tube were ligated and cut away. The other ovary seemed in good condition, and the uterus was in good position, so that it was not fixed by suspension. The Fallopian tube presented a pea-sized nodule in its wall. This nodule is due to the presence of carcinomatous tissue in the wall of the tube as demonstrated by

microscopical examination. The patient was heard from in 1907, when she still had considerable pelvic distress, and a second operation for removal of other ovary, etc. At this time the organ removed showed no sign of carcinoma.

A re-examination of the sections of the appendix by Dr. J. H. Wright in the case of Miss P. convinced him that the condition in the organ is carcinoma. The carcinomatous tissue consists of large and small columns and masses of atypical epithelium-like cells imbedded in a variable amount of connective-tissue stroma. The cells are generally smaller than the general run of carcinoma cells and do not form tubules as is commonly the case in cancers of the intestine. In a few places there are appearances suggesting the origin of the carcinoma cell masses from the dilated tubules of the mucosa. The tumor tissue does not appear to infiltrate the outer layers of the muscular coat of the appendix.

A re-examination of the sections from the Fallopian tube reported under the date of January 15, 1898, shows a carcinoma in the wall of the tube. There is no involvement of the mucous membrane. The carcinoma shows, generally, narrow columns of epithelial-like cells imbedded in a moderate amount of stroma. The cells in general are larger than the cells of the carcinoma of the appendix. There is nothing, however, inconsistent with the idea that this carcinoma of the Fallopian tube may be a metastasis from the carcinoma of the appendix.

CASE V.—Personal communication from DR. A. VANDER VEER.—Report from the Bender Laboratory of the Albany Hospital. Miss M. A., aged fourteen. Clinical diagnosis: acute appendicitis. Operation by Dr. Sibley.

Specimen consists of a swollen and previously sectioned appendix measuring 6.5 cm. in length. The external surface is covered in places by an exudate of rather adherent, yellowish-white material. All coats are thickened. Mucosa presents numerous punctate hemorrhages and is ulcerated in patches. Two cm. from the proximal end there is a slight thickening of the tissues, particularly of the mucosa. Anatomical Diagnosis: Acute diffuse and ulcerative appendicitis. Acute fibrinopurulent periappendicitis.

Microscopical Description: On section all coats are thickened and infiltrated by polynuclear leucocytes. Exudation of lymph on peritoneal surface. Mucosa ulcerated in patches. Other sections show all coats to be invaded by irregularly branching and anastomosing columns of polyhedral cells.

Microscopical Diagnosis: Carcinoma simplex of appendix. Acute diffuse and ulcerative appendicitis. Acute fibrinopurulent periappendicitis. Patient was in good health three years after operation.

CASE VI.—Personal communication from DR. A. VANDER VEER.—Report from Bender Laboratory of the Albany Hospital.

Miss W. P., aged thirteen. Clinical diagnosis appendicitis. Operation by Dr. Hacker.

Specimen consists of a markedly thickened appendix, firmer than normal and measuring 4 cm. in length. The peritoneal surface is pinkish-red, has firm fibrous tags attached, and 1 cm. from the tip, presents a small perforation which communicates with the lumen; the tissues about this opening are greenish-black. The lumen is patent throughout. The mucosa is pinkish-gray, shows numerous spots of ecchymosis and is everywhere thickened. Accompanying the specimen is a strip of omentum 8 cm. in length which shows at one end a fibrinopurulent exudate. It is deep red and has fibrous tags attached.

Anatomical Diagnosis: Chronic appendicitis with acute exacerbation, gangrene and perforation.

Microscopical Description: Section shows the mucosa to be atrophied and in some places entirely absent. The stroma about the gland follicles shows eosinophilic infiltration. The lymph-follicles are enlarged and show young connective-tissue infiltration. At one side of the section in the submucosa is an area containing but little connective-tissue stroma, showing numerous clefts filled with masses of large cells with deeply staining nuclei and having no definite arrangement.

Microscopical Diagnosis: Carcinoma of appendix. Chronic appendicitis with acute exacerbation and necrosis.

CASE VII.—Personal communication from Dr. A. VANDER VEER.—Report from Bender Laboratory of the Albany Hospital. Miss K. B., aged twenty-one. Clinical diagnosis was chronic appendicitis.

Specimen consists of a previously sectioned appendix. Distal two-thirds considerably thickened. The peritoneal surface shows numerous dilated blood vessels and at the distal extremity firm red tags. At the junction of the middle and proximal thirds the lumen is obliterated and the distal end is considerably thickened and filled with a greenish fecal mass. The mucous membrane of the distal two-thirds is grayish-red, showing spots of hemorrhage. The remainder of the mucosa is apparently normal.

Microscopical Description: Sections of appendix show mucous membrane diminished in amount and crowded together, the lumen being obliterated. There is an increase of connective tissue in the submucosa and there are numerous newly formed blood vessels. The muscular coat shows a moderate, small lymphocytic infiltration and the peritoneum is œdematous and has irregular tags of delicate, œdematous tissue interrupting its free surface. In the submucosa there is a growth composed of areas of cells with large, deeply staining, vesicular nuclei separated by strands of connective tissue and arranged in alveolar form. The connective tissue surrounding this new growth is deeply infiltrated with small round cells. The new growth is more or less circumscribed and pushes aside a portion of the mucous membrane.

Microscopical Diagnosis: Chronic obliterative appendicitis. Primary carcinoma of the appendix.

CASE VIII. HARTE. Admitted to Pennsylvania Hospital 10–17–'07; discharged 11–7–'07. G. P., man, age 41. Came to the hospital complaining of slight dull pain, soreness, and some tenderness in right iliac region for the past three months. Mother operated upon for carcinoma of the breast two months ago. History otherwise negative. Always robust and healthy except for appendiceal trouble and an attack of typhoid fever at fifteen. No venereal history.

Present illness dates back about two years when he had abdominal pain and tenderness, vomited and was slightly constipated; was compelled to go to bed for a day or two. The following week had another attack and subsequently had slight attacks of abdominal pain and discomfort lasting two to three days, every month, for three or four years; attacks then decreased in frequency up to about four months ago, when they recurred with increased severity and pain and tenderness in right iliac fossa became more pronounced and he had some slight nausea and constipation. Appetite good. Condition remained about the same until his operation.

Physical Examination: Well built man; heart, lungs and urine negative. Abdomen negative.

Operation (Dr. Harte): Incision in right rectus. Mass four by eight cm. in size found lying free in right iliac fossa and continuous with appendix. It was very much like a swollen testicle. Mass removed and appendiceal stump inverted in the usual manner. Incision closed in layers and supported with through and through silkworm gut sutures. Uninterrupted convalescence. Wound healed nicely.

Pathological Examination: The specimen consists of a large, more or less egg-shaped cyst which measures approximately 6 or 7 cm. in length and appears as large as a goose egg. The cyst has been opened but the contents are still adherent to the wall.

It is a soft, sticky, jelly-like material, part of which is opaque and yellowish-green, parts seem translucent and dark yellow in color. Here and there are small masses of blood.

Altogether the contents of the cyst measures at least 100 c.c. The outside of the cyst is quite irregular in appearance. It is generally of a pinkish color and shows many injected vessels. Over all parts of the external surface there are irregular white thickened patches ½ to 2 cm. in diameter, which are quite firm and definitely raised. The margins are

quite well outlined. Some of them extend down toward a line of fat which is taken to be the meso-appendix and which extends throughout the cyst along one surface. This meso-appendix is rather small.

At the proximal end of the cyst there is a narrow stump which looks like the appendix. This measures about ½ cm. in length and a little over ½ cm. in diameter. The wall of this small bit of appendix is continuous with the wall of the cyst, though the appendix begins very suddenly. The stump of the appendix as well as the cyst has been opened.

Only a few mm. at the extreme proximal portion suggest in the least a normal appendix. Here the lumen seems to be lined with a soft mucous membrane. The area between this and the cyst is filled with a fairly firm, opaque, yellow material which apparently has occluded the appendix.

The incision which was made in the operating room continues through the mass, which was cut in two, and into the cyst. It can not be told, now, whether there was communication between the cavity of the cyst and the lumen of the proximal end of the appendix. The wall of the cyst, where the gelatinous material has been removed, appears very irregular and has a lumpy appearance. It is lined by what looks to be a thin yellowish parchment-like membrane. In places the yellow-like material is quite firmly attached to the wall.

When some of the nodules on the serous surface are cut into they seem to be of an opaque, firm, yellow material.

Sections through the proximal end of the appendix show the following appearance: The subserous coat looks somewhat congested, thickened and contains fairly large accumulations of small round cells. The muscular walls are thick and the inner circular coat is two or three times the thickness of the outer longitudinal coat. Besides the thickening there is much degeneration in the muscular coats. The fibres are swollen, hyaline and separated by a great deal of loose connective tissue. In the submucosa, which is rather thin, there are localized accumulations of small round cells, often with centres composed of large pale cells. These are taken to be the remains of lymphoid follicles. There is an increase in the connective tissue in the submucosa. The normal mucosa is entirely lost. In its place there is a thin layer, of what appears to be hyaline fibres separated by a few connective tissue cells. On the surface of this hyaline material there are very curious cells. These are large irregular cells, sometimes elongated or goblet-shaped and projecting toward the lumen of the appendix. Many of them are filled with refractal granules. They are of a great variety of shapes and sizes. Many of them contain two nuclei, some appear as giant cells containing four to twenty nuclei or more. The nuclei are rather small, elongated and deeply staining. Covering these cells is a layer of hyaline looking material which contains cell remnants and red blood corpuscles; near the lining cells this material stains blue in hæmatoxylin, towards the centre it stains pink in eosin. This material corresponds to the jelly-like contents of the cyst. The small nodules between the proximal portion of the appendix and the neck of the cyst show in two sections different appearances.

In one section the nodule is composed of connective tissue infiltrated with small round cells, cells of epithelioid and plasma-cell type, and shows spaces, particularly near the surface, containing the hyaline material. Covering the surface of this nodule there is an irregular fringe of large cells described before. Great numbers of very large giant cells are seen and mixed with them are the elongated and columnal cells of epithelial type. This large cell gradually mixes with the blue-staining cyst contents.

Sections through another nodule show a definite carcinoma simplex. The cells are rather small, irregularly polygonal, have deeply staining nuclei and lie closely packed in spaces of various sizes. Some of the spaces are quite large but there are rarely degenerative changes in the centre. No definite karyokinetic figures are seen. The masses of cells infiltrate rather extensively the underlying muscular coats and in the nodules are separated by a moderate amount of connective tissue.

Sections through the wall of the cyst show much the same appearance as sections through the wall of the proximal part of the appendix.

The muscular coats are more irregular, sometimes being thick, sometimes thin and the accumulations of small round cells in the tissue above the muscular coats is more extensive and more diffuse. The lining membrane is practically the same and shows great numbers of giant cells. Sections through the hard masses in the cyst wall show them to be composed of old hyaline connective tissue.

Anatomical Diagnosis: Carcinoma of the appendix. Cyst-formation with muciginous contents.

CASE IX.—HARTE.—M. K., woman, age 39. Admitted 2–19–'03. Discharged 3–30–'03.

Previous History: Patient has been sick three days with severe pain and tenderness in right iliac region; bowels have not moved for four days; no vomiting and no fever. Has never had similar attack before but has had three attacks of gastritis.

On admission: Temperature, 102.2°. Abdomen fat; distinct rigidity of right rectus, with marked tenderness in right iliac region, where there is also increased resistance. Urine: Very faint trace of albumin and a few hyaline casts; otherwise negative.

Operation (Dr. Harte): Under ether an incision was made in right iliac region and appendix was found to be thickened, inflamed and very rigid, being practically broken off about 1 cm. from its base. Slight adhesions, no pus. Stump of appendix was ligated and excised. Wick of iodoform gauze carried down to bottom of cavity and wound partly closed. Slight fecal discharge which lasted a short time but closed before the patient left the hospital. On discharge there could be felt an irregular, hard mass in region of the wound. Pathological diagnosis: Primary carcinoma of the appendix.

Specimen consists of a small piece of fat and connective tissue about the size of a hickory nut, in the centre of which there is some gray necrotic material. On section the lumen of the appendix is found imbedded in the mass. The mucosa is swollen and red.

Microscopical Examination: The appendix is the seat of the most extensive changes. No coats but the external muscular can be made out. Everywhere there is extensive infiltration of polymorphonuclear leucocytes and the production of new connective tissue. The lumen is filled with leucocytes and desquamated epithelial cells. Glands are found only in what remains of the mucosæ in one or two sections; they extend from the surface, where here and there the remains of superficial epithelium can be seen, down deep into the appendix wall. They form long irregular ducts or spaces, lined sometimes by several layers of cuboidal or polygonal epithelium, and sometimes completely filled by such epithelium; often the layers of cells are detached from the wall of the space. These irregular ducts and spaces extend into the muscular coat. The stroma of the mucosa and submucosa is entirely destroyed or altered so that the coats are formed of granulation tissue densely infiltrated with polymorphonuclear leucocytes and small round cells. This acute inflammation extends about the appendix into the mesentery and fatty tissues. The growth of ducts and alveoli becomes more irregular and atypical the further they are removed from the lumen of the appendix. They extend into the mesentery and invade the granulation tissue of the region. Sometimes distinct atypical gland-like arrangements exist. The cells forming the invading tumor are very irregular, polygonal, and have variously shapen vesicular nuclei. In the sections where the growth in the mesentery is larger, the gland-like arrangement is very well marked. Sometimes the centre of the gland-like spaces is filled with blood cells.

Patient has been lost sight of.

The following cases have been collected from the literature:

Case 1.—Rokitansky[50] (1847) (from Elting).—Autopsy on individual aged 82, who died of pulmonary disease. The appendix was transformed into a sac six inches in length and two inches in diameter and was adherent to the posterior side of the cæcum. The walls of the appendix appeared fibrous in character and the cæcal orifice of the appendix was obliterated and the sac thus formed contained a yellowish-white, gelatinous material.

Case 2.—Rokitansky[50] (1854).—Individual aged 68, who died of pneumonia. The appendix was two inches in length and the distal two-thirds was transformed into a spindle-shaped fibrous sac about the size of a pigeon's egg, which contained a yellowish gelatinous material traversed by fine reticulated processes which took their origin from the wall of the sac.

Case 3.—Rokitansky[50] (1866).—An individual aged 70, who died of heart disease. The appendix was four inches in length and the distal 2.9 inches was transformed into a sac distended with a gray gelatinous material. This portion of the appendix was about one inch in diameter and the wall was of a fibrous character; from it numerous delicate processes ran in different directions through the gelatinous contents.

CASE 4.—ROKITANSKY[50] (1866).—An individual 38 years of age, who died of pulmonary and intestinal tuberculosis. The appendix was 1.9 inches in length and consisted of two compartments. The distal, lined by a smooth mucosa, contained a grayish gelatinous material, while the proximal compartment was distended with a gelatinous material traversed by numerous delicate strands of tissue, which appeared to originate from the fibrous wall of the compartment.

There is some doubt as to the carcinomatous nature of these cases of Rokitansky as no mention is made of the microscopical structure.

CASE 5.—BEGER.[4]—Man aged 47. Three and a half years previously had an abscess in right iliac fossa which on operation yielded a pint of odorless pus; fistula remained and tumor grew through it. No escape of feces or flatus. Operation showed that fistula led directly to appendix which was everywhere infiltrated with carcinoma. The appendix was about six cm. in length and about the thickness of one's finger. At the base of the appendix, a walnut-sized papillary tumor projected into the cæcum. The patient died soon after the operation, and at autopsy metastatic involvement of the retroperitoneal glands was found. The microscopic diagnosis was adenocarcinoma.

Rolleston and Jones consider this to be the first authentic case of primary carcinoma of the appendix, and Elting, Baldauf and Zaaijer mention it in their lists of cases.

CASE 6.—DRAPER.[8]—Man aged 65. Healthy until three months previous when had alternating diarrhœa and constipation. Could not retain food for three months before death. Autopsy: Stenosis of ileocæcal valve. Proximal one-third of appendix dilated to size of a plum. Cæcal juncture also dilated and the thickened wall typical of colloid cancer. Peritoneum normal.

CASE 7.—STIMSON.[55]—Female, aged 44. Appendiceal attack lasting several weeks ten years previously. Well until two mild attacks two months before operation. "Cancerous degeneration" of appendix. Ring of thickened mucosa projecting into cæcum.

CASE 8.—MOSSE and DAUNIC.[41]—Female, aged 50. Had no appendiceal symptoms when she died of cardiac disease. Appendix only organ showing cancerous change. Tumor in mucosa and muscularis in part alveolar and in part cylindrical in type; lumen entirely obliterated.

CASE 9.—ROLLESTON.[51]—Female, aged 26. Operation during fourth appendiceal attack. First was fourteen months previous. Tip was adherent to ovary and was seat of primary, spheroidal-celled carcinoma size of a marble, which infiltrated almost to serosa. Other viscera appeared normal and were not suspected before microscopical examination. Three months later was losing flesh and strength. (Rolleston and Jones report that she was well five years later.)

CASE 10.—A. O. J. KELLY.[36]—Clinical history lost. Appendix 11 cm. in length; for 3 cm. at proximal end the diameter is 8 mm.; distal to this it is 1.2 cm. in diameter. There are areas of ulceration of the mucosa toward the proximal end, and just distal to these there is an area of tumor formation 6 mm. in diameter; this consists of a connective-tissue

stroma which forms alveoli surrounding nests of epithelial cells. Diagnosis: Carcinoma. Good recovery, but since lost sight of.

CASE 11.—A. O. J. KELLY.[36]—Mrs. E. S., aged 24. Three previous attacks, the last being three weeks before operation. No adhesions. Appendix 9 cm. in length and about 6 mm. in diameter. Lumen patent. Towards the base of the appendix its wall is infiltrated with narrow columns of cells apparently in intimate relation with the surrounding connective-tissue stroma, there being no sharp demarcation between the tumor cells and the stroma as in carcinoma. Diagnosis: Endothelioma. Patient was well when seen ten years later.

CASE 12.—A. O. J. KELLY.[36]—J. M., man aged 19. Was well until nine days before operation, when he had symptoms of acute appendicitis with a palpable mass in the right iliac fossa. Operation: Small encapsulated collection of pus about cæcum and appendix, which latter was 5 cm. in length and 1 cm. in diameter. On removing a coating of fibrinopurulent exudate the appendix proved to be much distorted. A microscopically small growth was found almost entirely within the submucosa. The tumor cells were arranged in nests supported by a stroma of altered submucosa. Diagnosis: Carcinoma of the appendix. When seen about nine years after the operation patient complained of having had occasional pains in right iliac fossa and has had constant tenderness in the incision. No subsequent operations.

CASE 13.—A. O. J. KELLY.[36]—T. R., man aged 63. Numerous appendiceal attacks shortly before operation. Appendix adherent, and like the intestines was studded with grayish white, miliary nodules. Retroperitoneal glands enlarged. Patient died from shock. Microscopical examination of the appendix showed it to be everywhere the seat of carcinomatous infiltration. The invading epithelial cells are sometimes in the form of nests and elsewhere form the walls of hollow tubules.

CASE 14.—HURDON.[21]—Mrs. G., aged 24. No symptoms pointing directly to appendix. Operation by Dr. Kelly for release of pelvic adhesions, suspension of uterus and removal of appendix; which latter was found densely adherent, and bulbous at its free extremity. There is a flexion between middle and outer thirds, and proximal to this the lumen is normal. To the distal side there is a soft concretion the size of a date stone, and situated in the intervening portion there is a small adenocarcinoma invading all coats. In good health when heard from nine months later.

CASE 15.—GISCARD.[18]—Male, aged 37. Mild attack eight months before a more severe one which led to operation in a few days. Abscess and local peritonitis. Obstruction of lumen at mid-appendix by cicatricial thickening, distal to which there was some pus. At this point microscopical examination showed a mixed adenoalveolar carcinoma situated between the mucosa and muscularis and occupying about one-half of the circumference. The tumor seemed to spring from the deeper layer of the glands. Good recovery.

CASE 16.—WHIPHAM.[42]—Female, aged 45. Abdominal swelling and

tumor in right iliac region. Healthy until five weeks previous when had symptoms of malignant disease but none pointing to appendix. Inoperable. Mass of intestines and omentum. Died in two and a half months. Primary spheroidal-celled carcinoma in base of appendix invading all coats but serosa.

Of this case Rolleston and Jones say: "This case is excluded by several authors on the ground that there were growths also in the glands, liver, and the left ovary, which last they regard as the primary seat of the disease. It is, however, accepted by Moschcowitz, who agrees with Whipham that the origin in the mucous coat of the appendix shows that the growth was primary there, a view which we also take."

CASE 17.—SUDSUKI.[36]—Man, aged 40. Discovered at autopsy. Endothelioma the size of a pea found in the lower one-third of an appendix 11 cm. in length. Lumen patent and mucosa appears normal to the naked eye. Microscope shows it to be thin and devoid of epithelium and Lieberkuhn's glands. Submucosa compressed, and between it and the muscularis the tumor is found slightly infiltrating the latter and the serosa. Endothelium of lymph spaces much proliferated and it is believed that the tumor originated there.

CASE 18.—MCBURNEY.[37]—Woman, aged 23. Severe appendiceal attack two years previously. No adhesions. Two strictures, one near base and the other near apex, where there is a solid tumor the size of a pea. "Pure carcinoma." No metastasis.

CASE 19.—MCBURNEY[37] (Lartigau's case).—Man, aged 30. Discovered at autopsy. No history of appendicitis. "Pure carcinoma," somewhat larger than a pea in tip.

CASE 20.—GOFFE.[37]—Girl, aged 15. Increasing appendiceal pain for one year. No mass. Typical carcinomatous tumor 5 mm. in diameter developed in appendiceal wall at tip.

CASE 21.—REGLING.[46]—Man, aged 59. Attack preceded by anorexia for six months and for last six weeks had cramp-like abdominal pain. Abdomen distended. Lateral dulness disappearing on change of position. No tenderness or mass. Symptoms of obstruction led to operation. Tumor (scirrhous invading muscularis) size of hen's egg apparently starting from base of appendix invades outer side of cæcum for a short distance. Benign obliteration of free end of appendix; other end is a thick-walled dilatation filled with fish bones, etc. Stricture at ileocæcal junction due to adhesion of ileum and cæcum but not malignant. Carcinoma preceded by chronic inflammation. Fecal fistula and death in four months.

CASE 22.—JESSUP.[38]—Married woman, aged 36. Operation for ovarian cyst, following the last of five abortions. Appendix found surrounded by adhesions. Kink and constriction at junction of middle and distal thirds, beyond which there is a slight dilatation surrounding a firm, yellow adenocarcinoma infiltrating muscular coat. There were no symptoms pointing to appendix.

CASE 23.—HARTE and WILLSON.[39]—Maiden, aged 24. Appendiceal attack of one month's duration about five years previously. Numerous less severe attacks during entire winter one year previously, but made

apparent recovery until one month before operation when symptoms returned. Operation. Appendix free from adhesions and to naked eye appeared to be normal externally and internally, except for almost entire obliteration of lumen. Local infiltration of all coats by scirrhous carcinoma 1 cm. from tip. Patient was well when recently seen seven and one-half years after operation.

CASE 24.—HARTE and WILLSON.[39]—Frank L., aged 25 (in service of Dr. Le Conte). More or less continuous pain in right iliac fossa for eight months. Operation: Appendix adherent behind cæcum and ruptured near tip. Concretion size of grape seed. Sections of appendix about one centimetre from tip showed a carcinoma simplex springing from the mucosa and involving all coats. Acute suppurative appendicitis. Good recovery until four and one-half months later when he had symptoms of intestinal obstruction from a band of adhesions, and bowel found to be gangrenous. No evidences of malignancy. No autopsy.

CASE 25.—WEIR.[61]—Man, aged 23. History of thirteen attacks of appendiceal pain in two years. Nothing felt through abdominal wall. Appendix strongly kinked and knobbed a little at its end. Pathological Report: Usual inflammatory changes in mucous membrane and a small mass of adenocarcinoma at the tip. Patient remained in good health for three years and was then lost sight of.

CASE 26.—WALSHAM.[67]—Man, aged 45. Had several appendiceal attacks. Operation: The appendix was thickened and ulcerated and when examined microscopically was found to be the seat of a columnar-celled carcinoma.

CASE 27.—NORRIS.[44]—Mrs. L. F., aged 27. No symptoms pointing directly to appendix. Operation for right inguinal hernia and salpingitis. Appendix reddened and adherent at tip, where lumen was occluded by a firm, yellowish-white mass in its terminal centimetre; here there was an old obliteration, but elsewhere evidence only of a mild chronic inflammation. Carcinoma simplex. Well when seen four years later.

CASE 28.—MOSCHCOWITZ.[40]—I. S., male, aged 37. Treated three years for supposed alcoholic gastritis. Later acute appendiceal attack with peritonitis. Operation: Free pus in abdomen. Appendix adherent and slightly gangrenous. Bean-sized adenocarcinoma in tip. No recurrence six and a half years later.

CASE 29.—MOSCHCOWITZ.[40]—R. P., female, aged 20. Ten-day appendiceal attack. Tenderness. No mass felt. Small hard nodule one inch from tip. Carcinoma simplex. No recurrence three years later when lost sight of.

CASE 30.—MOSCHCOWITZ.[40]—Mrs. G. D., aged 24. Five months pregnant. Present attack of five months' duration. Irregular fever. Leucocytes, 17,500. Pain in hypogastrium. Exploratory laparotomy negative, except for appendix adherent at tip; here lumen was obliterated and a colloid carcinoma found. No recurrence six months later.

CASE 31.—LETULLE and WEINBERG.[35]—Male. Discovered at autopsy after death from tuberculosis. Total obliteration of lumen. Small adenocarcinoma at tip starting from centre of old cicatrix.

CASE 32.—LETULLE and WEINBURG.[33]—Child, aged 12½. History of mucomembranous colic since infancy. Two attacks of appendicitis at interval of one year. Operation after second attack. Appendix adherent and contained an enterolith. A carcinoma of the adenocarcinomatous type was located at a point at which a stenosis had resulted from previous inflammation. Good recovery.

CASE 33.—LETULLE and WEINBURG.[33]—Female. Discovered at autopsy after death from pulmonary tuberculosis. Obliteration of lumen in distal 2 cm., where there was an adenocarcinoma below an old cicatrix.

CASE 34.—LETULLE.[34]—L. L., male, aged 35. Discovered at autopsy after death from tuberculosis of lungs and intestines. Adenocarcinoma size of cherry stone in tip. No adhesions.

CASE 35.—LETULLE.[34]—A. M., female, aged 39. Discovered at autopsy after death from tuberculosis of lungs, kidneys and intestines. Tumor size of hazelnut in tip with obliteration of terminal 4 cm. of lumen. Secondary to acute appendicitis. No adhesions.

CASE 36.—LETULLE.[34]—V. C., female, aged 59. Discovered at autopsy after death from pulmonary and intestinal tuberculosis. Adenocarcinoma of distal end with obliterated lumen at this point only. No adhesions.

CASE 37.—LETULLE.[34]—J. P., female, aged 26. Discovered at autopsy after death from pulmonary tuberculosis. Scirrhous cancer size of cherry stone in tip. Overlying peritoneum normal. Adhesions over cæcal half of appendix, which is chronically inflamed. Meso-appendix involved.

CASE 38.—LEJARS.[35]—Male, aged 27. Slight appendiceal attacks for three months, becoming more severe. At time of appendectomy cæcum looked normal and there were no adhesions or swollen mesenteric glands. Second operation two months later. General metastasis. Microscopically no portion of appendix proved to be free from carcinoma. Polyhedral-celled type of trabecular tendency.

CASE 39.—ELTING.[13]—Mrs. L., aged 36. Good health until eight years previously, when she had an attack diagnosed peritonitis. No more trouble until shortly before she had a bilateral salpingo-oöphorectomy. No symptoms of appendicitis. Appendix, although apparently normal, was removed as a precautionary measure and was found to contain a small alveolar carcinoma 1 cm. from the proximal end. Lumen everywhere obliterated. In good health three years later.

CASE 40.—ELTING.[13]—W. D., male, aged 81. Autopsy after death from pulmonary tuberculosis and cardiac disease. No symptoms of appendicitis. Colloid carcinoma of appendix. No metastasis.

CASE 41.—EDINGTON.[12]—Mr. P., aged 44. Diagnosed appendicitis. Had symptoms of "stomach catarrh" for two years. Operation: Body of appendix buried in adhesions (mesoappendiceal and enlarged glands) but tip was free. Proximally the appendix was quite narrow, distally thick, hard and bulbous. On passing the hand toward the pylorus, a hard band of omentum was found kinking the bowel and was removed. Patient gradually became weaker and died in three months. Microscopical examination shows a general adenocarcinomatous infection. All coats are involved.

CASE 42.—KAUFMANN.[36]—Woman, aged 31. Discovered at autopsy

after death from typhoid fever. Muscular coat of appendix almost destroyed by a diffuse, solid, round-cell carcinoma.

CASE 43.—JONES and SIMMONS.[24]—Female, aged 26.—Six appendiceal attacks in twelve years. Tenderness, but no mass. Adhesions seen with microscope only. Scirrhous carcinoma near base. Small section of cæcum removed at second operation and found to be normal. Also chronic appendicitis. Good recovery and well eight months later.

CASE 44.—ECCLES.[11]—Male, aged 18. Two typical appendiceal attacks in two months. Adherent thickened appendix. Two separate, small tumor masses in wall of appendix; one at junction of proximal and middle two-thirds and the other a little more distal. Spheroidal-cell cancer. Was well twenty-two months later.

CASE 45.—CULLINGSWORTH and CORNER.[3]—Maiden, aged 31. Two attacks of pain in right side in two weeks. Operation for fibromyoma of broad ligament. Appendix was removed on account of bulbous extremity which was found to contain a small spheroidal-cell carcinoma. Lumen obliterated at tip only. Eight months later patient was well but had no appetite.

CASE 46.—BURNAM.[6]—Man, aged 25. Recurrent appendiceal pain for two years. Appendix adherent to its meso at tip and acutely inflamed, especially to outer third where adenocarcinoma fills lumen and invades mucosa and muscularis.

CASE 47.—WEIR.[61]—Male, aged 22. Emaciation, cough and abdominal distention, with ascites for two months. Was thought to have tubercular peritonitis but the fluid injected into guinea pigs gave negative results. Operation revealed a large number of subperitoneal metastatic nodules but none in viscera. Transformation of appendix into a mass of mucoid carcinoma. No adhesions.

CASE 48.—WEINBERG.[60]—M. J., male, aged 22. Two appendiceal attacks, six years and one year previously. Lumen obliterated in terminal 2 cm., and here author thinks there is absolute proof that the epithelium has developed in an obliterating cicatrix, at the expense of a portion of a gland which escaped the inflammatory process and was caught in the cicatrix. Patient well four months later.

CASE 49.—SARGENT.[58]—Girl, aged 12. First attack. Abscess. Appendix acutely inflamed. Changes most marked beyond a pea-sized tumor which obstructs lumen half an inch from cæcum. Endothelioma. Was well five months afterwards. (The microscopical section from this case was seen by Rolleston and Jones who say that it is very difficult to state positively that it is not a spheroidal-cell carcinoma.)

CASE 50.—NERI.[43]—E. B., male, aged 29, who had repeated attacks of pain in the cæcal region following a kick in that part five years previously. The appendix, removed at operation, showed a primary adenocarcinoma in the middle of a chronically inflamed organ. There was no metastasis.

CASE 51.—MYERSTEIN.[42]—Female, aged 26. Discovered at autopsy after death from hæmoptysis. Carcinoma simplex with traces of alveolar type invading all coats in distal half of appendix.

CASE 52.—KUDO[30] (Einlauf No. 876, 1905, Prosektor).—Boy, aged 8. Operation for acute perityphlitis. Tumor size of a pea in middle of appendix, invading submucosa. Muscularis and serosa not invaded. Carcinoma simplex.

CASE 53.—KUDO[30] (sections Jour. No. 549, 1905, Path. Inst.)—Man. No history of appendicitis. Autopsy: Appendiceal opening enormously dilated and hard tumor the size of a walnut protrudes 1 cm. into cæcum. Adenocarcinoma with transition into carcinoma simplex.

CASE 54.—KUDO[30] (Einlauf, No. 1507, 1905, Prosektor).—Man, aged 35. Acute appendicitis. Nodule size of a pea springing from mucosa at tip. Muscularis but slightly invaded. Carcinoma simplex.

CASE 55.—KUDO.[30]—Woman, aged 26. Tumor size of a cherry obstructing lumen in proximal end. Middle third obliterated. Carcinoma simplex.

CASES 56–57–58.—KORTE.[29]—Unexpectedly came across three cases of carcinoma of the appendix in youthful individuals from 12 to 28 years of age. Once in an interval operation and twice while operating for acute appendicitis. Microscopical diagnosis of all three was adenocarcinoma and all were living at the time they were reported.

CASE 59.—H. KELLY[28] (Thorndike, Boston City Hospital).—Woman, aged 30. Seven years of recurrent appendicitis, becoming severe one week before operation. Appendix thickened; distal portion cystic, and base indurated and carcinomatous. A portion of cæcum removed with appendix. Microscopical Examination: Small alveoli lined with columnar cells, which often entirely fill the lumen. All coats to serosa involved. Uneventful recovery.

CASE 60.—H. KELLY[28] (Monks, Boston City Hospital).—Woman, aged 24. First attack; two days' illness and epigastric pain becoming localized in right iliac fossa. Moderate tenderness to left and below umbilicus. Operation: Appendix twisted on itself. Bulbous tip enveloped in mass of inflammatory exudate. Easily separated. Yellowish nodule 0.6 cm. in diameter, 1.5 cm. from tip. Adenocarcinoma replacing mucosa and invading muscularis. Slight chronic appendicitis. Uneventful recovery.

CASE 61.—H. KELLY[28] (J. H. H., Surg., No. 9037).—Colored man, aged 19. History of abdominal cramps (recurrent) but no definite appendiceal attacks. Symptoms of acute appendicitis for ten days and extremely painful mass in right iliac fossa which proved to be omentum surrounding a small fetid abscess. Temperature, 101.8° F.; pulse, 110; leucocytes, 16,000. Appendix thickened and adherent to wall of abscess. Two cm. of median portion of lumen obliterated by an alveolar carcinoma invading all coats. Small perforation at distal end of tumor. Uneventful recovery.

CASE 62.—DRIESSEN.[10]—Removed an appendix from a young married woman after a third attack of appendicitis. The appendix showed a small alveolar carcinoma in the middle of a chronic inflammatory mass which obliterated the lumen of the organ at its middle. There had been no recurrence after five and a half years.

CASE 63.—BATTLE.[3]—Girl, aged 14. Four appendiceal attacks in one year. Operation: Mass of omentum adherent to bowel. Appendix removed

with difficulty. Was twisted on itself. One constriction near distal end which cut off marble-like portion full of pus, and another a little nearer cæcum beyond a hard, yellowish-white, spheroidal-celled carcinoma the size of a marble.

CASE 64.—BARROW.[2]—A. H., girl, aged 18. First attack. Symptoms of appendicitis following diphtheria; together of one month's duration. Bulbous tip of appendix adherent to posterior wall of cæcum. Local area of inflammation in cæcum, colon and ileum but apparently no malignant infiltration. Mesenteric glands enlarged. Cancerous involvement of bulbous, distal one-third of appendix only, where there were two small tumor nodules. Polymorphous type.

CASE 65.—BALDAUF[1] (Bender Lab. 128–1904).—Mr. H., aged 38. Previously well. Symptoms of appendicitis the day before operation. Appendix bound down by adhesions and underneath umbilicus. Beginning peritonitis. Easy removal. Uneventful recovery. Pathological Examination: Appendix considerably thickened and covered with fibrin. Lumen patent. Mucosa injected and the seat of foci of necrosis. Anatomical Diagnosis: Acute appendicitis. Microscopical Examination: At mesenteric side, mucosa is ulcerated and replaced by a new growth invading all coats and infiltrating meso. Microscopical Diagnosis: Carcinoma simplex with ulceration. Acute appendicitis. Periappendicular suppuration.

CASE 66.—BALDAUF.[1]—Mr. B., aged 23. Two appendiceal attacks six and five months previous, and a last beginning five days before operation. Clinical Diagnosis: Subacute appendicitis. Appendix removed with difficulty. Pathological Examination: Obliteration of lumen. Fibrous tags externally. Tumor not suspected until Microscopical Examination: Mucosæ replaced by carcinoma simplex invading muscularis, and to mesenteric side, subserous tissue.

CASE 67.—BALDAUF.[1]—Girl, aged 8. Previous history negative. No symptoms referable to appendix until two days before operation, when she had a severe appendiceal attack. Appendix surrounded by inflammatory mass which ruptured during removal and a small amount of pus escaped. Pathological Examination: Proximal half normal, other end thickened and indurated and surrounded by a layer of partially organized tissue. Lumen normal. Anatomical Diagnosis: Partial organization of periappendicular abscess. Microscopical Examination: Carcinoma simplex involving submucosa. Muscularis uninvolved.

CASE 68.—WARTHIN.[59]—Married woman, aged 32. Salpingitis with mass of adhesions involving ovary, appendix, cæcum and small intestine. Appendix alone carcinomatous and lumen obliterated. No naked eye evidences of malignancy. Microscope showed involvement of all, including proximal, sections so condition may have extended into cæcum. Basal-celled carcinoma. Was well three years later.

CASE 69.—LANDAU.[31]—Woman, aged 33. Currettement at eighteen followed by violent local peritonitis. Operation for removal of myoma of uterus and left-sided adnexæ. Removal of appendix which was rigid, bent on itself in several places and thickened at the apex. Its mesentery adherent to colon. Length 6.5 cm. Proximal half short and normal; tip

hard. No enlarged glands. Microscope shows carcinoma simplex.

CASE 70.—ZAAIJER.[64]—Woman, aged 37. Chronic appendicitis with exacerbations. Numerous adhesions found at operation. Chronically inflamed mucosa with traces of acute abscess formation. Pea-sized tumor at apex showing, histologically, a solid alveolar carcinoma. Walls infiltrated to subserosa.

CASE 71.—ZAAIJER.[64]—Girl, aged 20. Symptoms of hysteria and chronic appendicitis. Operation: Appendix somewhat thickened, with local, chronic periappendicitis. At apex, an obliteration 1 cm. in length was the seat of an extremely small neoplasm (0.5 x 1.1 x 1.1 mm.). No apparent connection between this and the surface or glandular epithelium. Diagnosis: Carcinoma solidum diffusum.

Patient showed no evidence of recurrence fourteen months later.

CASE 72.—ZAAIJER.[64]—Miss —., aged 26. Vague abdominal symptoms for several years culminating finally in a well-marked appendicitis. Appendix firmly adherent, with tumor 3½ cm. long in tip. Mixed adeno- and cylindrical-celled carcinoma. Infiltration of mesentery, and extension along blood vessels to peritoneum. No sign of recurrence six months later.

CASE 73.—ZAAIJER.[64]—Man, aged 25. Chronic relapsing appendicitis for thirteen years. Operation: Marked adhesive periappendicitis. Mucosa and glandular tissue atrophic. Submucosa greatly thickened. Gelatinous mass size of a lima bean in apex. Appearance was that of colloid cancer, although positive proof of this could not be given even with the microscope.

CASE 74.—ZAAIJER.[64]—Girl, aged 23. Appendectomy one month after a first, slight attack of appendicitis. Appendix showed a marked chronic inflammation, with a pea-sized tumor near the tip, projecting polyp-like into the lumen. Infiltration of submucosa, muscularis and mesentery. Tumor was partly adenomatous and partly of the solid type. No evidence of recurrence two and a half years later.

CASE 75.—ZAAIJER.[64]—Girl, aged 12. Appendectomy one month after first attack. Evidences of chronic appendicitis, especially in subserosa. In the tip was found a bean-sized carcinoma of the round-celled type which had compressed the surrounding tissues but had infiltrated the muscularis at but one point. No evidence of recurrence after three years.

CASE 76.—ZAAIJER.[64]—Girl, aged 17. Appendectomy after two weeks of appendicitis. Stricture 2 cm. from tip. Proximal portion of stricture contained a pea-sized carcinoma of the solid type with adenomatous tendency.

CASE 77.—SCHRUMPF.[54]—Woman, aged 35. Discovered at autopsy after death from transverse myelitis. Small, hard tumor the size of a hazelnut at distal end of appendix. Serosa pale and unirritated. Mucosa replaced by adenocarcinoma which infiltrates the submucosa and at one point the muscularis.

CASE 78.—PATEL.[46]—Man, aged 58, who had had double inguinal hernia for twenty-five years. For last two months the right hernia was painful and of late could not be returned as formerly. Operation: Appendix found lying free in sac with its tip distended and filled with small

foreign bodies, one of which resembled a fish bone and another a scale of enamel. The wall was thick and hard and on microscopical examination the tip was found to be the seat of a scirrhous carcinoma. Good recovery.

CASE 79.—MASON and RHEA.[26]—F. H., housewife, aged 22. Three gynæcological operations in three years. During the last the appendix was removed although apparently normal and microscope showed scirrhous cancer in tip. No metastases found in the other organs examined.

CASE 80.—HESSBERG.[22]—Female, aged 76. Found at autopsy. No history of appendiceal trouble. Appendix sprung from posterior wall of cæcum and was wound around latter so that appendiceal lumen was only visible to microscopical examination. Tumor nodules the size of a pea. Carcinoma simplex.

CASE 81.—HENKING.[20]—Man, aged 23. History of diarrhœa. Appendix removed two years ago; ever since has had pain in right iliac fossa which has increased in the last three months. Six months before lost a pint of blood by bowel. Abdomen tender, especially in right iliac fossa, where there is dulness and fluctuation. Operation: Abscess in scar tissue. Second operation ten days later. Medullary carcinoma of stump of appendix invading ileum and cæcum which were resected. Gelatinous swelling of peritoneum.

CASE 82.—GRÜNBAUM.[19]—Female, aged 19. Violent pain in cæcal region one month before admission. During operation for pyosalpinx appendix was found adherent to reddened and enlarged ovary. Tip of appendix thickened and the seat of a yellowish, dense carcinoma simplex invading all coats. Mesenteric glands uninvolved. No metastasis into tubes or ovaries.

CASE 83.—BRANDTS.[5]—Boy, aged 8. Ten weeks before admission had pain in right iliac fossa, fever, distention, and obstinate constipation. Second attack six weeks later and third attack four days before operation with vomiting, etc. Operation: Intestines covered with fibrin. Appendix was perforated to the proximal side of a small mass. Removal. Appendix 6 cm. in length.

Microscope shows the small mass to be a solid carcinoma to which the perforation was secondary. Necrotic inflammation. The carcinoma produced stenosis, and inflammation followed.

CASE 84.—BRANDTS.[5]—Man, aged 35. Had pain in right hypochondrium for several years; was frequently jaundiced and had clay-colored stools. Also attacks of pain in right iliac fossa. Physical Examination: Tenderness over gall-bladder and appendix. No tumor in liver region. Operation: Gall-bladder and ducts negative. Appendix 8 cm. long with small tumor in its tip. Microscopical Examination: Scirrhus, with suspicion of adenocarcinoma.

CASE 85.—MCWILLIAMS.[28]—Maiden, aged 20. Never sick until had typical, acute appendiceal attack on arrival at Ellis Island. Three ounces of pus evacuated. Enteroliths and muco-pus in lumen, also spheroidal-celled scirrhous cancer size of a pea in tip. All coats but serosa invaded.

CASE 86.—OBERNDORFER,[46] in speaking of small intestinal cancers that had come under his observation, mentions a carcinoma of the appendix

in a boy of seven years of age. As no details are given, this case is of a doubtful nature.

CASE 87.—WHITE.[48]—Woman, aged 75, died on the ninth day of an attack of acute intestinal obstruction due to a Richter's hernia into the right femoral ring. Thirty-five years previously she had what seems to have been an attack of acute appendicitis. At autopsy the appendix was found bound down to the posterior wall of the abdomen by dense adhesions and was two and one-half inches in length and, toward the distal extremity, one-half inch in diameter. Microscopically there was an irregular overgrowth of epithelium invading the deeper tissues. In places there was a glandular formation, but most of the cells had undergone a complete colloidal degeneration. A single gland at the ileocæcal angle was enlarged to the size of a cherry and proved to be carcinomatous. The cæcum and other viscera were free from infection.

CASE 88.—A. O. J. KELLY.[27]—Mrs. S. B., aged 23. Severe appendiceal attack five years, and mild attack four weeks before. Constipated since first attack. Palpation negative except for local tenderness. Operation: Appendix kinked on itself and curled around cæcum. Appendix cut out of cæcum. On section a new growth is seen to extend from the tip, almost if not quite, to the proximal end. All coats are invaded and the thickness of the organ is increased. The lumen is almost completely occluded except at proximal end. Microscopically there are lesions of chronic appendicitis with evidences of acute exacerbation. The epithelial cells are arranged in nests and some have undergone mucoid change. In good health one year after operation.

CASE 89.—A. O. J. KELLY.[27]—Miss F. L. B., aged 17. Eight hours before admission to hospital was seized with acute, general abdominal pain, gradually becoming localized in right iliac region. Abdomen rigid on right side and local tenderness over McBurney's point. No mass. Operation: The appendix, which was nonadherent, was 9.5 cm. in length and about 1 cm. in thickness, the distal 6 cm. being the more distended. The serosa was coated with fibrin. About midway a well-marked constriction was found separating proximal and distal portions, and the latter was filled with a sanguinopurulent material. Macroscopical evidences of a new growth were first seen while sections were being prepared for microscopical examination. A small infiltration of the submucosa, opposite the mesentery, extended 1.5 cm. from the constriction to the proximal end. Microscopically there were evidences of a moderate grade appendicitis. The tumor consisted of narrow columns of cells infiltrating the submucosa. In some regions the origin of the cells from the endothelial lining of the lymph channels is obvious in their lining such spaces. Microscopical Diagnosis: Endothelioma and acute appendicitis.

CASE 90.—A. O. J. KELLY.[27]—Miss L. B., aged 27. During last two years has had severe attacks of pain in upper right abdominal quadrant. During first attack had a chill and pain was referred to right shoulder. Was jaundiced for two months. Operation: Gall-bladder normal. Appendix 8 cm. long and 0.3 thick, except for a bulbous enlargement 1.3 cm. at tip. New growth was not observed on macroscopical examination, but

was later found to comprise a small nodule about 3 mm. in diameter extending 2 cm. from the tip of the organ. The tumor consists of nests of epithelial cells supported by a well-developed connective-tissue stroma; the submucosa especially is the seat of the infiltration, but the muscularis is also slightly invaded even to the subserosa. Diagnosis: Carcinoma and chronic appendicitis with exacerbation. Uneventful recovery.

Case 91.—A. O. J. Kelly.[27]—Miss M. K., aged 28. Previously well. Attack began a few days before operation with severe cramp-like pains in abdomen which became localized in right iliac fossa. There was marked rigidity and tenderness of the right abdomen, with nausea and vomiting, and a definite mass could be palpated. Operation: Considerable pus evacuated. Appendix acutely inflamed, perforated and adherent to colon. The appendix was 6 cm. long and from 0.6 to 1.5 cm. in thickness. The tip was much dilated—the lumen to 0.8 mm. in diameter and contained a hard calculus. The tumor could only be detected with the microscope, which revealed evidences of acute inflammation and showed the new growth to be limited to the tip. It consists of nests of epithelial cells, in a well-developed connective-tissue stroma, replacing the mucosa and infiltrating the muscularis. Diagnosis: Carcinoma and acute ulcerative appendicitis with perforation. Uneventful recovery.

Case 92.—Le Conte.[28]—T. R., woman, aged 21. Attacks of sharp pain in appendiceal region for ten years. Final attack lasted one week. Violent pain, soreness and palpable tumor size of a hickory nut in same region, and nausea.

Intussusception of appendix into cæcum with tip protruding. Ileocolic glands enlarged. Portion of cæcum excised with appendix, and pathological report suggested a wider carcinomatous involvement. Six weeks later a more extensive resection was performed with removal of seven inches of bowel and a number of mesentric glands, two of which showed metastatic involvement from the primary adenocarcinoma in the appendix.

FOLLOWING ARE THE BRIEF RÉSUMÉS OF THE CASES OF SARCOMA OF THE APPENDIX.

Case 1.—Gilford[14] (Sarcoma).—Woman, aged 27, with symptoms of chronic appendicitis for thirteen years. Spindle-cell sarcoma of appendix which was adherent to colon and ileum, which were uninvolved.

Case 2.—Glazebrook[18] (Sarcoma).—G. G., colored man, aged 55. Discovered at autopsy after death from apoplexy. Appendiceal adhesions. Dense, fibrous, endothelial sarcoma the size of a pigeon egg, near tip. Originated in serosa and invaded all coats.

Case 3.—Warren[25] (Sarcoma).—Boy with symptoms of chronic appendicitis, intermittent pain, and fever for one month. Tumor of ileocæcal angle with involvement of appendix. Round-cell sarcoma with glands extending to root of mesentery. Was well four years later.

Case 4.—Patterson[47] (Sarcoma).—Man, aged 39. History of uneasiness in right iliac fossa for three months. Occasional sharp pain. No vomiting until acute attack before operation. Tender mass in appendiceal region. Operation: Appendix thick, firm, and adherent. Cæcum

thickened for one-quarter inch about appendix. Thickened portion of cæcum removed with appendix. Patient died six hours later. Autopsy: No trace of tumor elsewhere. Round-cell sarcoma beginning in appendix and involving all coats with exception of serosa.

CASE 5.—CARVARDINE[7] (Sarcoma).—Female, aged 45. Symptoms of appendicitis for five months. Severe pain in right iliac fossa, diarrhœa and frequent attacks of severe colic. Tenderness and deep-seated swelling in same region. Operation: Appendix three and a half inches long and the size of one's thumb; very hard; adherent; olive-shaped tip. Cæcum not involved but head and neighboring enlarged gland removed. Recurrence on left side. Death nine months later. Microscope shows lymphosarcoma.

CASE 6.—CARVARDINE[7] (Sarcoma).—Man. Appendix removed for relapsing appendicitis. The central portion contains a small fecal concretion, and in the apex there is a whitish tumor the size of a hazelnut. Several of the neighboring glands are enlarged. Microscopically the tumor consisted almost entirely of lymphoid tissue. Author speaks of it as a lymphosarcoma (also as a lymphocytoma).

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CARCINOMA OF THE APPENDIX WITH METASTASIS TO THE ILEOCOLIC GLANDS.*

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THE subject of carcinoma of the appendix has been extensively reviewed by my colleague, Dr. Harte, and it is clear that the diagnosis of this disease, when limited to the appendix, cannot be made before operation. Even after operation the pathologist is generally the first to discover its presence in an organ removed for other causes. In the majority of cases the disease seems to be entirely confined to the appendix, and the removal of that organ brings about a cure. In a few cases, however, microscopical examination reveals that the disease has gone beyond the appendix, and these cases are of special interest to the surgeon, for they compel a second more or less dangerous operation. I desire to report a case of this type in which the primary growth in the appendix had spread to the cæcum and presented metastases in the ileocolic glands.

A. B., aged 21; female; single; white; American. The family history was negative, except that many members were rheumatic, the patient herself being a frequent sufferer. She had had most of the diseases of childhood, including scarlet fever followed by nephritis. From the age of eleven, that is, for ten years, she had had repeated attacks of sharp pain, localized in the right iliac fossa, sometimes with chilly sensations and slight fever, at other times with no disturbance of temperature. The sharp pain would last from a few hours to a day or two, and subside with a feeling of soreness. These attacks were usually attributed to some indiscretion in diet.

April 20, 1907, the patient was seized with violent pain in the appendix region while at dinner; the pain was so severe that she almost fainted. She had chilly sensations and felt slightly

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feverish; had nausea but no vomiting. After a couple of hours the pain lessened in severity and was followed by a feeling of discomfort and soreness in the right iliac region. During the next five days she had several slight attacks of this colic. I saw the patient in consultation with Dr. Henry C. Earnshaw four days after the onset of the attack.

Physical Examination.—Thin but not emaciated; color good; slight lateral curvature of spine. Chest negative. Temperature and pulse normal. Abdomen retracted; no rigidity; slightly tender mass the size of a hickory-nut palpable in appendix region. Cæcum distended with gas. Urine contained a trace of albumin but no casts. There was some anæmia: R. B. C., 4,264,000; Hb., 75 per cent.; leucocytes 8,600. Operation was advised and accepted.

April 27, 1907, the abdomen was opened through a gridiron incision and the palpable mass was found to be an intussusception of the appendix into the head of the cæcum. About an inch of the tip of the appendix was visible beyond the cæcal margin. The portion within the cæcum was almost round and nearly an inch in diameter. It felt like an inflammatory mass and was thought to be due to the chronic condition of the intussusception. The portion of the cæcum containing this mass was resected and the opening closed with Lembert sutures. A small pin-head sized pearly mass was noticed on the cæcum an inch beyond the area resected, but at the time of operation nothing was thought of it. The ileocolic glands were somewhat enlarged. The abdomen was closed with layer sutures and the recovery was uneventful. The patient was discharged from the hospital May 11, 1907, in good condition, weighing 116 pounds.

The examination of the specimen was made by Dr. Warfield T. Longcope, Director of Ayer Clinical Laboratory, and the findings confirmed by Prof. Allen J. Smith, of the University of Pennsylvania.

Pathological Report.—The specimen consists of a portion of the cæcum and the appendix. The major portion of the specimen consists of a rounded, mulberry-like mass, 2½ cm. in diameter, which has a mottled red and yellow surface. This is said to be the mucous membrane of the colon, though it has lost all resemblance to normal mucous membrane.

Towards the middle of the specimen there is a collar-like contraction

and the colon surface forms a little frill about it. Coming out from this collar is the tip of the appendix which forms a curved bulbous knot about 2 cm. in length and 1 cm. in diameter. The surface is fairly smooth and white. Here and there are a few yellow pin-point nodules. It has a cystic feel. When it is opened a thick buttery material escapes. The lining is thick, opaque and white. The lumen can readily be found, and a probe passes into it from the colon and out through the most prominent portion of the main mulberry-like mass. Evidently there is a partial invagination of the appendix in the colon.

Sections are made through the tip of the appendix. It has been opened. Instead of the mucous membrane there is an irregular growth of cells arranged in more or less solid alveoli. The spaces filled with cells are separated by a moderate amount of connective tissue stroma. The cells forming these nests are oval, regular, and contain quite deeply staining round nuclei. The protoplasm is poorly made out. No karyokine figures are seen. Here and there a space is seen lined by high columnar epithelium filled with mucus. They resemble the normal crypts of the appendix. The growth is seen extending down into the submucosa and infiltrating the muscular coats. The small nodule on the external aspect of the appendix is composed of a growth like that of the appendix itself.

When it was discovered that the appendix was the seat of a carcinomatous growth, sections were made through the portion of the appendix invaginated in the cæcum and through the wall of the cæcum itself. The sections present a curious appearance. The sections in general show four definite zones. A central cellular area, a wide zone of smooth muscle, beyond which is a second cellular zone covered by the fourth zone formed by the mucous membrane of the colon. In the centre corresponding to what should be the lumen and mucous membrane of the appendix, is a solid growth of small polyhedral cells arranged in large spaces separated by a delicate or fairly thick connective tissue stroma. Surrounding this central growth is a wide circular band of smooth muscle which evidently represents the muscular coats of the appendix and cæcum. In some sections this band is complete and unbroken, while in others it is infiltrated more or less extensively with the cells of the growth. Outside of the smooth muscle ring is the second cellular zone, which evidently takes the place of the submucosa of the colon. This zone is quite wide and is made up almost exclusively of irregular solid masses of cells of the new growth, which are separated by a connective-tissue reticulum. In many places this growth in the submucosa is separated from the mucosa definitely by the muscularis mucosa. The mucosa itself looks thin, the crypts are not numerous, and the stroma is filled with small round cells. In other sections the muscularis mucosa has been destroyed and there is direct connection between the growth in the submucosa and the mucous membrane.

In a few places in the sections comparatively normal crypts of Lieberkühn are seen, but usually replacing the crypts there are irregular tortuous spaces, extending from the surface into the solid growth below, which are partially or entirely filled with the polyhedral cells form-

ing the new growth. The stroma between is œdematous and infiltrated with polymorphonuclear leucocytes, small round cells and epitheloid cells.

Such sections suggest that the growth may have originated from the glands of the mucous membrane of the cæcum, but it is difficult to say whether the growth extends down from the mucosa or up from the more extensively involved submucosa. From the fact that the entire appendix, even to its tip, is the seat of a growth, and from the fact that the mucous membrane of the colon shows a new growth in only one or two places where there is a direct connection between the growths in the submucosa, it seems reasonable to suppose that the carcinoma arose from the appendix and involved the cæcum by direct extension of the growth.

Diagnosis.—Carcinoma arising in the appendix. Invagination of appendix into cæcum with extension of growth to that portion of cæcum which surrounds the appendix.

The pathological findings were fully discussed with the father of the patient, and after some delay a second operation was agreed to.

June 11, 1907, an incision was made through the right rectus muscle, and the cæcum with three or four inches of the ileum was resected, including the entire group of ileocolic glands. A lateral anastomosis was made with rubber-covered clamps and Pagenstecher thread. As the mesenteric vessels were ligated as near the back as possible, there was a slight hemorrhage from one of the vessels before it was secured with forceps. This deep removal of the mesentery was done to insure the complete removal of the ileocolic glands. The wound was closed without drainage.

For 48 hours after operation the patient was quite ill, with vomiting, distention and signs of intestinal paresis. The bowels were finally moved, the vomiting ceased, and from then on the recovery was uneventful.

The patient left the hospital at the end of three weeks weighing 113 pounds. Two months after the operation her weight had increased to 121 pounds, and March 1, 1908, her weight was 129 pounds. Her best weight previous to these operations had been 132 pounds. She is apparently in perfect health.

Second Pathological Report.—The specimen consists of the cæcum and about 10 cm. of the ileum. The ileum to the right of the specimen is bound by adhesions to the cæcum. The line of junction is covered by a delicate film of connective tissue. The point of excision of the invaginated appendix is entirely hidden. At the point where the ileum and cæcum are adherent there are, deep down, firm adhesions. A number

of the ileocolic glands and the mesentery are included in the specimen. On opening the intestine a thick, yellowish-green material escapes from the ileum. The cæcum is filled with the same material. The mucous membrane looks pinkish, soft and apparently normal. In the deepest part of the cæcum is a dimpled scar in which one sees a stitch. At the base of this point the cæcum and ileum are adherent and the adhesions, though not extensive, feel hard. The mesenteric lymph-nodes vary from 0.5 to 1.5 cm. in diameter. They are regular but quite firm and white. On section some of them show small whitish points along the periphery.

Microscopical Examination.—Sections are made through the adhesions at the seat of operation, through the ileum and colon above and below the seat of operation and through eleven of the mesenteric lymph-nodes. *At the seat* of the operation the section includes a few of the stitches. The subperitoneal surface of the colon and ileum are adherent. Between these surfaces there is a little blood, fibrin and granulation tissue. There is a general infiltration with small round cells, epithelial cells, plasma cells and a few polymorphonuclear leucocytes. About the remains of the stitches there are many foreign body giant cells. The mucous membrane of the colon and the ileum is slightly œdematous. The lymphoid follicles are greatly swollen and the germinal centres show hyperplasia. In the mucous membrane of the ileum, and especially of the colon, there are great numbers of eosinophiles. There are no evidences of tumor growth.

Sections through the colon and ileum below and above the operation wound appear normal except for swelling of the lymphoid tissue. *All the mesenteric lymph-nodes* show some swelling of the lymphoid tissue with some endothelial proliferation. Many of the lymph sinuses are dilated. Occasionally they contain many lymphoid cells. In two of the lymph-nodes metastases are found. They lie in the peripheral sinuses, localized fairly well in one position. In one gland the metastases also extend into the sinuses surrounding one follicle. The cells have a gland-like arrangement, suggesting very closely the structure of the original growth. The cells are columnar or cuboidal, and lie in columns and rows. The protoplasm is granular and the nuclei oval and pale. A few karyokinetic figures are seen.

Diagnosis.—No return of growth found at seat of operation. Metastases to two mesenteric lymph-nodes.

The second operation seems to have been fully warranted by the metastases found in the ileocolic glands, and the judgment of the two pathologists who examined the specimen in urging a second operation proved correct. While it was rather anticipated that we would find in the cæcum areas of malignancy, particularly at the pinhead-sized pearly spot which was noticed at the time of the first operation, yet a careful

examination of all the tissue removed failed to reveal any malignancy except in the mesenteric glands.

The sequence of events in this appendix might be explained in two totally different ways: First, that the epithelial growth was of the character of the small benign tumors sometimes found in different parts of the intestinal tract, and which may be present for long periods of time with very slow growth. Such a tumor through the slow formation of fibrous tissue may have drawn the appendix within the cæcum, and after the growth had invaded the walls of the cæcum through extension, metastasis to the ileocolic glands followed. In other words, the tumor may have been practically local and latent until the cæcum was invaded, when its malignant characteristics developed.

Second, that the appendix had been the seat of long-standing chronic disease which recently had undergone malignant change, the operation uncovering it in its early stages. The pathologists, I believe, would rather favor the first view expressed.

SPLENECTOMY IN BANTI'S DISEASE,*

FOLLOWED BY ŒDEMA OF THE LARGE INTESTINE WITH LOCALIZED NECROSIS OF ITS WALL.

BY JOHN E. SUMMERS, Jr., M.D.,

OF OMAHA, NEB.

THE subject of this report was referred to me by Dr. W. F. Milroy from the Medical Service of the Douglas County Hospital, Omaha, and in making this reference the following was submitted:

History.—John K., aged twenty-one; American; height, five feet eight inches; weight, one hundred and fifty-six pounds; occupation, cook; entered the hospital December 1, 1906. His family history was negative. For two or three months each spring, from the time he was a young child until his thirteenth year, he suffered from diarrhœa, being well the remainder of each year. When thirteen years old he was in bed four months with diarrhœa. Eight or ten times during this attack he passed a little blood mixed with mucus. After this illness there were similar ones of mild character, becoming less severe each summer. This trouble has not recurred since 1903.

In 1902 the patient had his body severely squeezed between two cars, and immediately vomited about a teacupful of blood. There was no other blood passed at that time.

In the spring of 1905 he was very sick for two weeks with malaria. In the fall the malaria recurred twice, but was controlled by quinine. Later, having discovered a tumor in his abdomen, he was told by a physician that this was his spleen.

At about 8:00 P.M., August 5, 1906, the patient fell, his abdomen striking heavily across the edge of a board. He felt sick and faint and went to bed. He had a good night and felt well next morning. At breakfast he was nauseated and began to vomit blood. The first was dark and clotted; afterward it was bright red. A small amount of blood was also passed from

* Read before the American Surgical Association, May 6, 1908.

the bowel. He was put to bed, where he remained two weeks. On November 30, while standing in the street, he discovered blood running from his bowel. The quantity was estimated at eight ounces. There was no vomiting; the next stool contained blood.

Physical Examination.—Lungs normal. A well-marked and widely distributed mitral systolic murmur with strongly accentuated pulmonic second sound was present. Left border of the heart nearly one inch to the left of the midclavicular line and the right border one inch to the right of the right sternal line. Liver apparently about normal in size. Tenderness in the left hypochondriac region. The spleen reaches from the seventh rib to within two finger-breadths of the level of the umbilicus and as far as the left parasternal line.

There was a moderate amount of ascites but no other dropsy.

Urinary Examination.—Negative.

Diagnosis.—Trauma, cancer, peptic ulcer, and decompensated valvular lesion are readily eliminated. Although the malarial organism has not been found in repeated blood examinations, it can hardly be doubted that the patient has had that disease. However, the first hemorrhage occurred three years before the patient contracted malaria. The exsanguinating hemorrhage of August 5, 1906, took place when the patient was in the best of health, and ascites is not caused by malaria under conditions like the present.

Tubercular peritonitis is suggested by the history of the prolonged intestinal trouble and ascites. The following considerations negative this theory: first, the good general nutrition of the patient; second, the healthy condition of the lungs; third, the patient recovered from the diarrhœal trouble; fourth, he has no fever; fifth, peritoneal exudate, if inflammatory, has a specific gravity of 1.018 or more, and contains albumin, 4.5 per cent. or more. If not inflammatory, it has a specific gravity of 1.015 or less, and contains albumin, 2.5 per cent. or less. Sixty ounces of fluid were withdrawn from the patient's abdomen. It had a specific gravity of 1.009, and contained albumin, .08 per cent.

"Splenic anæmia," so called, is scarcely regarded as a pathological entity. It is an obscure condition about which we know little. In this disease the spleen is greatly enlarged, firm, smooth, and commonly tender. The enlargement is usually progressive.

There is no other glandular enlargement. There is progressive dyspnœa and muscular weakness very much as in pernicious anæmia. Hemorrhages from the gastro-intestinal tract, repeated at intervals, are characteristic. Between these attacks the health may be good. When the disease has existed for a long while the liver may show a secondary cirrhosis. This is the condition known as "Banti's disease." Hemorrhage often occurs before any change has taken place in the liver and is due apparently to mechanical obstruction of the venous circulation of the stomach in those areas which are drained by the splenic vein. Ascites may be present.

The following report by Dr. Bliss indicates the condition of the blood at the first examination after the patient entered the hospital:

Blood examination of J. K., Douglas County Hospital.—Red blood corpuscles, 2,120,000; white blood corpuscles, 4,000; hæmoglobin content, 40 per cent.; color index, 1 minus; polymorphonuclears, 70 per cent.; small lymphocytes, 23 per cent.; large lymphocytes, 4 per cent.; large mononuclears, none; transition cells, 2 per cent.; eosinophiles, 1 per cent.; some poikilocytosis; no nucleated reds; no plasmodia malariæ.

Dr. Milroy, in summing up his examination, was rather inclined to the theory that we had to deal with a cirrhosis of the liver with malaria rather than to the theory of a splenic anæmia with malaria.

My own impression was that a pernicious anæmia having been excluded it was rather splitting hairs in giving a name to the pathology, its nearest symptom-complex corresponding in my opinion to Banti's disease: it filled to the letter Senator's definition of Banti's disease, viz., "Splenic anæmia with ascites, without local evidence of a general and otherwise positive tuberculosis." Urobilin was not found in the urine,—this is important when positive, but it does not negative the diagnosis of Banti's disease.

Medical treatment having failed and as the man was suffering from pain and despondency, I recommended splenectomy, which was accepted and carried out February 28, 1907. The operation was difficult because of adhesions, and there was considerable hemorrhage. The pedicle was secured in separate catgut ligatures. The liver was smaller and paler than commonly

observed during operations upon other viscera, the intestines appeared normal. Shock was extreme, and active painstaking measures were demanded to overcome it. These efforts included hypodermoclysis, hot salt solution enemas, strychnine hypodermically, etc. The patient reacted and was progressing fairly favorably when, on the morning of the eighth day following the operation, there developed the usual symptoms of an acute inflammatory intra-abdominal lesion in the right lower quadrant, and I operated upon the man the same night for a supposed acute perforative appendicitis,—the symptoms seemed classical. Upon opening the abdomen through the usual incision of the right rectus muscle, the diagnosis of appendicitis was proven a mistake. Instead the following conditions were presented: there was a large amount of bad-smelling turbulent fluid in the abdominal cavity. The sigmoid flexure had become displaced to the right and fixed; besides it was very œdematous. On its right mesenteric border there was a dime-sized perforation through which a thin feculent discharge was escaping, and in addition there were two sphacelated spots distal to the perforation, about the size of a nickel each, which were about to perforate. The perforation and the necrotic spots were on the same line extending for three inches parallel to the mesenteric border and about one-half inch distant from it. Because of the œdematous condition of the bowel it was impossible to make a secure invagination of the necrotic line, any tension causing the stitches to tear out. The technic employed was to fold in the necrotic line as well as possible by means of a double button-hole stitch, and then tack an omental flap over the area involved. The cæcum, and its appendage, was in the same œdematous condition as was the sigmoid, and the rectum was so œdematous that it practically filled the pelvis. None of the small intestine was observed. After thorough irrigation, the lower peritoneal cavity was sponged as dry as possible and local and pelvic tubular drainage established. The œdema of the lower sigmoid and rectum was so great that difficulty was encountered in introducing the rubber drainage-tube between it and the empty bladder, into the pelvis. The man was placed in Fowler's position. To the astonishment of all interested, the relief of the intra-abdominal tension following the incision and the establishment of drainage, stopped the gangrenous process in the sigmoid, and admitted of repair to the

extent of preventing further intestinal leakage into the peritoneal cavity. A fecal fistula formed. The postoperative history shows that for days and weeks the man's life was in jeopardy because of a persistent diarrhœa and our inability to nourish him. Gradually, however, improvement began, and to-day he is able to get about, walk down town, and is gaining in weight. Occasionally there is a discharge from a knitting-needle sized fistula which I have not thought it prudent to operate upon. In addition to the giving of tonics he has taken the extracts of spleen and bone marrow. Last fall (after a visit to Dr. Crile) I filled the patient's blood vessels with good healthy blood by direct transfusion. The transfusion operation was apparently not of any particular benefit.

The case I have outlined represents typically a thrombosis of the splenic vein, the thrombus occluding to a lesser degree the superior and to a greater degree the inferior mesenteric veins, the arteries not being occluded. Moist gangrene of the sigmoid resulting. It is without doubt somewhat analogous to the case reported by Delatour in his paper entitled "Thrombosis of the mesenteric veins as a cause of death after splenectomy," published in THE ANNALS OF SURGERY, 1895. His patient died from thrombosis of the superior mesenteric vessels and a thrombus was also found in the splenic vein. A rotation of the spleen upon its axis had occurred before operation and besides Delatour questions whether or no the ligation of the pedicle *en masse* may not have had something to do with the formation of the thrombus in the splenic vein and its extension into the superior mesenteric vein; the nearer the ligature the firmer the clot was found to be. Edens, in the "Mittheilungen aus den Grenzgebieten der Medizin und Chirurgie," Achtzehnter Band, Heft 1, 1907, reports a case of thrombosis in the splenic veins in a fatal case of a symptomatic Banti's disease. The splenic vein was very tortuous, the lumen widened, and in many branches were found fresh and older thrombotic masses. Microscopically a section of the spleen showed marked dilatation of the splenic vessels, in many places the elastic tissue of the arterial wall being entirely

broken through and thrombi being forced into the spleen pulp. In all branches of the splenic vein Edens found evidence of an endophlebitis and concluded that the thrombus formation outside of the spleen was due to changes within the spleen itself. On the other hand a section of the spleen from my case shows marked thickening of the fibrous capsule and considerably more stroma than normal in the trabeculæ. Other than a slight degeneration of the lymphoid cells of the pulp and a disintegration of the blood corpuscles in various areas, the spleen pulp is normal. There is no change in the blood vessels other than a slight thickening of the arterial walls and I find no evidence of either arterial or venous thrombosis.

These findings of the condition of the splenic blood vessels prove conclusively that the postoperative thrombosis of the splenic vein can hardly be considered from another standpoint than due to the traumatism of the splenectomy. In a study of the causes of death following splenectomy we find many cases reported as from peritonitis, and although I have no positive evidence in support of the theory that in some of these the peritonitis may have resulted from a thrombosis of the mesenteric vein secondary to a thrombosis of the splenic vein, yet when we consider Delatour's case and my own its occasional occurrence must be conceded.

The famous case of Elliott, reported in ANNALS OF SURGERY, 1895, in which he resected successfully forty inches of the small bowel for thrombosis of the superior mesenteric artery, has never been free from the suspicion that its origin was traumatic.

The writings of Broca and Schnitzler upon immediate and early enterorrhagias, those of Ullman upon late hemorrhages, and of Kukula upon the complexity of the causes of both types, are well known and all are really based upon the experimental work of Litten.

In the case just reported, the thrombosis was evidently traumatic and possibly with more gentleness in the handling of the pedicle preventable: just as I believe most cases of postoperative gastric and intestinal hemorrhages are due to either

venous or retrograde arterial thrombosis, and result from the trauma of the operation. A localized arteriosclerosis of the gastric or intestinal blood vessels has been demonstrated. In such subjects, and in those suffering from endocarditis, a thrombosis with hemorrhage and a possible perforation can come about independently of the trauma of an operation.

An exhaustive study of the literature of splenectomy by those in a position to carry out this research for me has failed to find reported a single case of œdema with gangrene of the *large intestine* following splenectomy. And I do not recall ever reading of gangrene of the *large* intestine resulting from a thrombosis of the superior mesenteric artery or vein,—it has always been the small bowel. From the favorable termination of my case it would therefore appear, as before stated, that the thrombosis must have been limited to the splenic vein and occluded in part only the mouths of both the superior and inferior mesenteric veins, chiefly the latter.

STONE IN THE BLADDER ASSOCIATED WITH INTERMITTENT PNEUMATURIA FOR THREE YEARS, AND THE SUBSEQUENT FORMATION OF FECAL FISTULA.*

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THE phenomenon of pneumaturia seems to be more common than a perusal of works on general or special surgery would lead us to expect. The writer has been unable to find any mention of the subject in the standard works with the exception of Kelly's volume on Appendicitis, in which he cites two cases of pneumaturia occurring as a sequel and complication of the disease. In one of these cases (Muhsam's) following a third relapse, the appendix ruptured into the bladder. As a sequel large quantities of gas were expelled with the urine, together with much pus. At the operation, the appendix was released from its adhesions, but no point of perforation could be found. The cystitis which had occurred as a result of the infection of the bladder from the intestinal tract, persisted for two months, when it subsided and for a time the patient appeared to be well; but after an interval the urine became turbid again and was found to contain plant cells and undigested animal fibres. About a year after the first operation a median incision was made and a connection between the cæcum and bladder was found. The repair of the fistulous openings was followed by complete recovery.

Although little mention of pneumaturia is made in the text-books, a search of current literature shows that many cases have been reported in the last twenty-five years. In an article published by Kelly and MacCallum in the *Journal of the American Medical Association* for August 20, 1898, in the bibliography at the end of the article, 22 cases of pneu-

* Read before the American Surgical Association, May 5, 1908.

maturia, due to the presence of gas-forming bacilli, in the genito-urinary tract, are cited, and 184 cases, due to fistulous communication between the intestinal tract and the bladder. It seems strange that, with such a wealth of literature on the subject, so little notice of this complication has been taken in the text-books. From the above statistics it will be seen that the vast majority of cases of pneumaturia are due to the establishment of a fistulous communication between the bladder and the bowel. Nevertheless, quite a number of cases of what one may term intrinsic pneumaturia have been reported, that is to say, originally within the urinary tract, and it is, therefore, of importance in those cases in which there is simply an escape of gas with the urinary stream, to determine whether the phenomenon is due to the formation of gas in a suppurating kidney—one case of which was reported in the article above mentioned—or to the formation of gas in the bladder. When this latter phenomenon is present it is almost always due to the decomposition of diabetic urine, with the consequent formation of carbon dioxide and alcohol. To distinguish between these different conditions is very simple, as for instance in Kelly's case, in which numerous bubbles of gas, with a discharge of pus, were seen to escape from the left ureter. Operation in this case disclosed a suppurating kidney which contained quantities of gas. The bacteriological examination, however, failed to isolate the organism which was responsible for the pneumaturia. If the pneumaturia originates within the bladder, incubation of the urine in a fermentation tube will prove that the urine itself is the source of the gas. On the other hand, the case which the writer desires to report illustrates the fact that it is possible for the fistulous communication between the bowel and bladder to be so narrow as to permit the escape of gas from the bowel, but without the appearance of feces in the urine and without the occurrence of cystitis, thus to simulate an intrinsic pneumaturia.

The history of this case covers nine years and is as follows:

A gentleman, thirty years of age, consulted the writer in December, 1903, and stated that four years previous he had been seized with a severe pain in the right side of the abdomen. This soon became intense, and was associated with distention and muscular spasms, so that the physician who was in attendance suspected an attack of appendicitis. It was finally, however, pronounced to be a right ureteral colic, with reflex abdominal symptoms. From that time until August, 1903, the patient remained perfectly well. Then a brick-red sediment appeared in the urine, which later became clouded. The patient also passed from time to time what he described as pieces of flesh. On two occasions his urine was extremely offensive, the odor being described as resembling the odor of asparagus urine or urine which was very stale. Late in August, while urinating, the patient was seized with a very severe pain, and took to his bed for two days; during this period every act of urination was painful, but the severity decreased, till, by the third day, the pain had disappeared. The urine was examined at this time by competent pathologists, and was found to be acid in reaction, containing urates and phosphates, but neither bladder epithelium nor pus. The first week in October he began to pass small quantities of blood at the end of urination. He also had three attacks of vesical spasm, ten days apart, each attack lasting for about a day. The urine now contained pus and blood, but continued to be of acid reaction. The attacks of pain ceased, and the patient resumed his business, travelling by rail twenty-five miles a day to the city and returning at night, without inconvenience; he was also able to play golf. Late in November, the patient noticed that the stream of urine was interrupted by bubbles of gas; this was of daily occurrence for about six weeks. It was invariably with the morning urination, and on one occasion the noise of the sputtering urine was heard in an adjoining room. In December the pain returned with some severity; also, the bleeding, which became more profuse. The patient was now brought to the city by his brother, a physician, and seen by the writer. On examination the right iliac fossa was quite tender on palpation, although no mass could be made out, nor anything resembling an inflamed appendix. The evening temperature was 102°, but fell to normal, from which it rarely deviated. Besides the tenderness, the patient also complained of pain in the same locality. Deep massage along the

right ureter was made, but no colon ferment could be detected. The day following this examination, the patient brought to the writer two long ureteral casts, which, when first seen, much resembled lumbricoid worms; they were in alcohol, however, and the patient said that they were bright red when first passed; closer examination showed them to be blood clots decolorized in the alcohol. After the passage of these casts, the right-sided pain ceased, as did the tenderness; but the pain on urination continued. Rectal examination disclosed a slightly enlarged prostate, which was, moreover, exceedingly tender. Some pus appeared in the urethra after massage of the prostate, but microscopic examination of this failed to show any specific organism, and the patient was absolutely without any venereal history. The urine now showed pus in large quantities and blood, but remained acid in reaction. As an uncle of the patient had died of tuberculosis, it seemed wise to exclude the possibility of a tuberculosis of bladder or kidney by inoculation tests before introducing any instrument into the bladder in order to avoid the possibility of a secondary infection. A guinea-pig was therefore inoculated with a small portion of centrifuged urine and killed at the end of six weeks. Examination of the peritoneum was negative, but caseous bronchial glands were found; these, when examined, were negative. A second inoculation gave entirely negative results, and tuberculosis of the genito-urinary tract was therefore excluded. The patient had, meanwhile, been improving rapidly; the blood and pus had disappeared from the urine, and the pneumaturia had ceased; he had also gained ten pounds in weight. A Thompson searcher passed into the bladder immediately disclosed a small stone, about the size of a chestnut. It was evident, however, that two symptoms still remained unaccounted for: the ureteral casts, and the pneumaturia. In order to settle the question as to whether the gas was formed by the urine itself, owing to the presence of some gas-producing bacillus in the bladder or kidney, it was, on several occasions, put into a fermentation tube, and allowed to remain in an incubator for twenty-four hours, but always with negative results. Up to this time, also, all examinations for the colon bacillus, whether by culture or smear, had been fruitless. Cystoscopy and radiography were now invoked for the purpose of determining if possible by the cystoscope whether there was any appearance in the bladder

suggesting a fistulous tract communicating with the appendix or bowel; by a radiogram, whether there was a stone in the kidney or ureter as well as in the bladder. The stone in the bladder was clearly seen by the cystoscope in the hands of Dr. Tilden Brown of New York, but nothing else abnormal was discovered in the bladder wall, which was pale; and, considering the presence of the stone, singularly free from all evidences of irritation. A radiogram clearly showed the stone in the bladder, but no evidences of calculus on the right side either in kidney or ureter. A small shadow appeared on the plate, however, low down on the left side of the pelvis, near what would have been the vesical end of the *left* ureter. This was thought to be an artefact, as the patient had never had any pain in the left side. The ureters were not catheterized at this time. The writer now determined to remove the vesical calculus by suprapubic cystotomy and to carefully inspect the bladder for any evidence of fistula. The operation was brief; the bladder was dilated with air, after the writer's method, the small stone was removed; no evidence of a fistulous opening being discovered the bladder wound was closed by suture, as was the skin incision, with the exception of a small drain at the lower angle of the wound to provide against leakage. The catheter à demeure was removed on the third day, and the patient left the hospital on the tenth day for his home. For six months he remained perfectly well, when he had a brief return of the pneumaturia for forty-eight hours, the gas escaping not with every urination in that interval, but two or three times each day. No pain. The pneumaturia then ceased. Once, during October of 1904—eight months after operation—the patient had an attack of pain in the right iliac region; and late in November, while at Lakewood, a similar attack. During the October attack, the patient had some tenderness in the iliac fossa, without fever or muscular spasm. With the pneumaturia and following it, pus reappeared in the urine, after a short interval, however, again disappearing. From November, 1904, until October, 1905, a period of eleven months, the patient remained perfectly well, taking a trip to Europe in the summer of 1905. A letter received from the patient in October, 1905, may be condensed as follows: "Trip to Europe, June 28; returned September 1 without an hour's illness; gained ten pounds in weight." Four days after return, while playing bridge one night, was

seized with severe pain in the right side and had to be helped upstairs. Had a severe chill and intense pain all night. On the third day, however, was able to get up and be about. Pain ceased entirely with the exception of a severe pain which comes at the end of the penis on urinating and continues for about half an hour afterwards. Urine was stringy with pus and two weeks after blood appeared again in the urine. Patient lost eight pounds in this illness, during which he was not seen by the writer. Patient wrote that he thought that a stone might have passed from the kidney to the bladder, the attack having been brought on by playing golf; he also stated that one night he knew, when urinating, that he was going to pass gas with urine, and actually did so. The patient, on recovery from this attack early in November, was taken to Dr. Tilden Brown, of New York, for ureteral catheterization, urine collected from both ureters and from the bladder, found to contain the colon bacillus and pus in microscopic quantities. A styletted ureteral catheter introduced into the left ureter showed that the small shadow which had appeared uniformly in all the several plates which had been taken was neither in the ureter nor close to it; pus could not be seen in visible quantities issuing from either ureter, and the urine was now clear. The patient had a moderate organic lesion of the heart, and his business affairs were in such a position that he was unwilling to submit to exploratory laparotomy, unless he was clearly in danger of his life. In January, 1906, he had another attack similar to that in October, with chills, high fever, and right-sided pain; this illness lasted ten days; patient passed some gas again; was not seen by the writer, owing to his residence in another city. In May, he went to Europe and, landing at the Azores, took a gallop on a donkey and that day passed gas in quantities, but without pain; this was on May 17. The pneumaturia ceased in two days. On June 18 while in Venice, and after ten days of rest, the patient had a severe pain at the end of the penis after which he passed a quantity of blood and pus. No pneumaturia nor pain in the abdomen. This attack was described as one of the sharpest attacks which had happened. On July 4 after a violent game of shuffleboard, patient passed gas again, but had no pain. On January 29, 1907, the patient writes that he felt an attack coming on, " with a kind of bearing down pain in the whole lower part of the abdomen "; for the first

time no pain transmitted to the penis; nor was there any spot on any part of the abdomen which was specially painful; abdomen sore all over. There was no rise of temperature, but more pus came each time the patient urinated; passed gas, however, with a rush; urine was pretty clear in the day-time, but thick with pus every morning. An examination of the urine passed at this time showed some vegetable fibres, and it became perfectly evident that at some point there was a communication between the intestine and the genito-urinary tract.

From that time to the present, the history of the case has been entirely clear, as a fecal fistula definitely established itself, the orifice of which can be seen by the cystoscope, about one inch above the right ureter. At present, the amount of fecal material is much less than it was a month or two ago. Recently the patient sent to the writer a small vial of urine which contained shad roe, with a note to the effect that he had eaten the roe at 5 P.M., and that it had appeared in the urine discharged at 11 P.M. of the same evening. A noteworthy fact connected with this remarkable case appears to be the extraordinary tolerance of the bladder. So far as is known to the writer, all cases of vesico-enteric fistula have been characterized by a furious cystitis. Nothing of the sort inconveniences the patient, his urine continues to be acid, and he apparently suffers no inconvenience from the fistula. In January he had some symptoms indicating a pyelitis of the left kidney, but these rapidly subsided after a day or two. Although warned of the certainty of an ultimate double pyelonephritis, for the present the patient absolutely declines an operation, because he feels perfectly well. In fact, he goes to business every day and has put on weight.

As one reviews the complete history of this case, now that all the clues are unravelled, the diagnosis seems to be sufficiently plain. An attack of appendicitis nine years ago, mistaken for renal colic, during which the appendix became attached to the bladder; then an interval of quiet for four years, followed by the establishment of a long, narrow fistulous tract between bladder and colon by way of an almost obliterated appendix; the formation of a stone about a tiny particle of slough, which marked the establishment of the fistula; the

closure of the tract for long periods, perhaps by mild inflammatory processes; the recrudescence of the trouble about the region of the appendix, at long intervals; finally the establishment of a permanent fistula. But this does not explain the ureteral clots, and it is within the bounds of possibility that the stone in the bladder was originally of renal origin. The case cannot be entirely cleared up until the patient submits to operation.

A number of cases of pneumaturia from vesico-enteric fistulæ have been reported in women. These have usually been the result of pelvic peritonitis, during which the bowel has become attached to the bladder, the fistula following as a result of direct infection from the damaged bowel to the attached bladder wall.

To sum up: Pneumaturia may be intrinsic, that is, originating entirely within the urinary tract, or extrinsic, in which it is due to communication between the urinary tract and the intestines. In the intrinsic cases, we must distinguish between those cases in which the pneumaturia originates within the cavity of a suppurating kidney and is due to a secondary infection by one of the gas-producing bacilli, and the more common cases, where a diabetic urine is decomposed within the bladder itself into CO_2 and alcohol. The former condition is curable by surgery, and the cystoscope of course offers the means of diagnosis, as in Kelly's case. When the pneumaturia is extrinsic in origin, we must distinguish between those cases inflammatory in origin, which are curable by operation, and those which are due to the eroding process of a carcinoma in the pelvis which has opened up a communication between intestine and bladder. With regard to the inflammatory cases, the only difficulty will be in determining the point of communication between the urinary tract and the bowel. This might be as high up as the transverse colon, or duodenum communicating with the renal pelvis or at some point on the ureter itself, or into the bladder. At one time, in the case which has been narrated, it seemed possible that a stone in the ureter might have ulcerated and

made a communication between bowel and ureter; such a hypothesis explains some of the symptoms. When the fistula has been between rectum and bladder (of which some instances have been reported) milk injected into the rectum promptly appeared in the urine. Methyl blue has also been used, but seems open to the objection that after an interval it would appear in the urine without the existence of a fistula, from absorption alone. The administration of bismuth, and a subsequent radiogram, might possibly be of help. Authors seem to be divided as to the chemical composition of the gas in these cases of pneumaturia. H_2S is readily soluble in water, so we should not expect this gas to be expelled as a gas but rather in solution. In fact, a number of cases of hydrothionuria have been reported. Scott has an article in the *New York Medical Journal,* June 17, 1893, in which he reports four cases—three of which were post partum, and one followed a laparotomy for pus tube. One woman furnished two cases, the hydrothionuria occurring after two successive labors twenty months apart. The odor of sulphuretted hydrogen was overpowering in these cases, but there was no pneumaturia. Chemical tests of the urine proved the diagnosis. It does not seem likely that H_2S would escape solution in the urine. In fact, in an article by Friedrich Müller, *Berliner klinische Wochenschrift,* October, 1889, No. 41, the analysis of gas in a number of cases of pneumaturia showed a preponderance of nitrogen, next in quantity being hydrogen and CO_2. A trace of H_2S was found by Ruge. The article is commended to those who are interested in the chemical composition of the gas expelled in such cases.

RESULTS OF OPERATION ON THE KIDNEY FOR CALCULUS AND TUBERCULOSIS.*

BY ANDREW J. McCOSH, M.D.,

OF NEW YORK,

Surgeon to the Presbyterian Hospital.

THE final outcome of operations is of wider interest than the immediate results. The object of the paper is to trace first the future life history of patients from whom in past years a tuberculous kidney had been removed. Definite figures as to the prognosis of these patients without operation were difficult to obtain. Easier to reach were the results which follow nephrectomy for this condition. In many cases decision as to the necessity for operation was very difficult. Most surgeons believe that functional restoration of the kidney which had once been the seat of tuberculosis was exceedingly rare. The writer believed, however, that under proper hygienic and climatic conditions it is possible, and related the history of such a case.

In his experience he had performed fifty-four nephrectomies, nineteen having been done for tuberculosis. There were no fatalities due to shock. Two patients died within a few weeks after operation. Eight patients died at periods of from one to three years after operation. Five patients have made a perfect recovery, and now enjoy excellent health at periods varying from six to nineteen years after operation. In three hundred and thirty cases of nephrectomy which he had collected there were about 20 per cent. of permanent cures.

Calculi.—He had performed forty-five operations for renal calculi. In this paper the septic kidneys, or those in a condition of pyonephrosis process were excluded from consideration. Fifteen nephrolithotomies had been performed by him. Twelve of these patients were perfectly well at the present time. It was a question with him whether the stone should be extracted through an incision in the parenchyma of the kidney or through one made in the renal pelvis. He had never been inconvenienced

* Author's abstract of paper read before the American Surgical Association, May 5, 1908.

by excessive hemorrhage and he was inclined to prefer the extraction of the stone through the kidney, rather than by an incision in its pelvis.

While these cases are not sufficiently numerous to throw much light on this question, yet it is suggestive that in five patients where the incision was made in the pelvis, leakage occurred in four. In six patients where the incision was made through the kidney itself, leakage occurred in one only. It is not quite fair, however, to judge from these figures that leakage of urine is less apt to follow incisions in the kidney than those in the pelvis, because in several patients the wound in the pelvis was but lightly sutured in anticipation of future need of external drainage, whereas the wound in the kidney was always thoroughly closed by suture. It is my impression, however, that there is less danger of leakage when the stone is extracted through the parenchyma of the kidney.

In the majority of patients with nephritic calculi either the pyelitis is so severe or the kidney itself is in such a state of advanced pyonephrosis that all question of closure of the kidney is at once settled. External drainage is necessary. There are, on the other hand, patients in whom the kidney itself appears comparatively normal and where the pyelitis is comparatively slight. Drainage seems, under such conditions, to be quite unnecessary. We will always, however, encounter a few cases where it will not be easy to decide whether or not to employ drainage. In all cases we must be sure that the ureter is patent. Drainage is indicated if there be any sign of disorganization of the kidney itself, if the calyces be much distended, if the urine should have been loaded with pus prior to the operation, if there should have been at any time fever or signs of sepsis, if much damage has been done to the kidney during the extraction of the calculus, and if there should have been crumbling of the calculus during the process of its extraction,—as under these circumstances some small fragments might have been left behind in the calyces. Should there be doubt as to the wisest method of procedure, a compromise may be made and the kidney very lightly sutured with fine (oo) catgut. Should the inflammation of the pelvis be so severe as to demand drainage, nature will come to its relief and burst open the sutured kidney, as occurred in one of my cases.

STONE, TUBERCULOSIS OF THE KIDNEY AND PERINEPHRIC ABSCESS.*

BY GEORGE TULLY VAUGHAN, M.D.,

OF WASHINGTON, D. C.,

Professor of Surgery in Georgetown University.

STONE may exist in the kidney or ureter without infection and infection may exist without stone, but both are often found together. The causes of stone are heredity, loss of balance between ingestion and assimilation, and sudden chilling of the body, leading to deposit of the urinary salts which are held together by the colloid material provided by the products of inflammation,—pus, blood, or mucus.

The *symptoms* of stone in the kidney are due to infection or the mechanical action of the stone, the most reliable being pain, renal colic, blood, pus, or gravel in the urine, and oliguria or suppression of urine.

Pain, aggravated by motion, is felt in the lumbar region and may extend along the ureter to the bladder, penis, testicle, thigh, foot, or may be referred to the sound kidney. Palpation or percussion over the kidney may cause pain. Renal colic may end in the stone passing into the bladder, dropping back into the kidney, or becoming impacted in the ureter—the point of impaction being indicated at times by pain and tenderness. Statistics indicate that the most common sites of impaction are, in order of frequency, the juxtavesical, the juxtapelvic, and the portion just above the brim of the pelvis. The cystoscope and Röntgen ray are of great value in making the diagnosis.

Phloridzin and cryoscopy may be used to test the functional activity of the kidneys. Casper injects .01 gram of phloridzin under the skin. This produces diabetes, lasting about 3 hours, and if one kidney is disabled by stone, tuberculosis, or other cause, the urine from that kidney contains a smaller quantity of sugar than urine from the other or healthy kidney. Also, cryoscopy shows that the urine from the disabled kidney contains less

* Author's abstract of paper read before the American Surgical Association, May 5, 1908.

solid matter and therefore freezes at a higher temperature (less degree of cold) than the urine from the healthy kidney.

TUBERCULOSIS OF THE KIDNEY is in the majority of cases secondary to tuberculous foci in other parts of the body, it is primary in about 15 per cent. of cases, it is often unilateral and is usually of hæmatogenous origin. Rarely it is secondary to tuberculosis of the bladder. Trauma, stone, gonorrhœa, and other inflammations predispose to it. The disease is more common in women between the ages of 20 to 45 and the ureter is affected in 10 to 15 per cent. of cases.

Urinary Symptoms.—Polyuria in the earliest stage, then blood and pus, are found in the urine—the former usually in small quantity and intermittent, the latter usually early, constant, and abundant.

Vesical Symptoms.—Painful and frequent micturition with tenesmus, varying in degree and frequency. Injection of the bladder or ulcers may be seen by the cystoscope.

Renal Symptoms.—Usually pain and tenderness in the kidney and enlargement on palpation.

General Symptoms.—These are chills, fever, sweats, emaciation, vomiting and uræmia.

PERINEPHRIC ABSCESS is the result of infection of the tissues immediately surrounding the kidney and is generally secondary to infection of the kidney or some more distant organ, as the appendix, gall-bladder, lung, pleura, intestines or bones.

The symptoms are often obscured by those of the primary disease, but the most common are pain, tenderness, chill, fever, sweats and a palpable mass in the region of the kidney. The pus may break into other organs or point externally in Petit's triangle.

Treatment.—Stone in the kidney should be removed at once (the best time is before infection occurs); impacted stone in the ureter, as soon as it is evident that it will not pass. A calculous kidney should not be removed as long as there is any chance of saving it, even if repeated operations are necessary.

Tuberculosis limited to one kidney should be treated by nephrectomy. If both are affected, nephrostomy and drainage are advisable. The best incision for nephrectomy or nephrostomy is the Morris or oblique incision just below the last rib.

ILLUSTRATIVE CASES.

CASE I.—*Patent urachus; stones in both kidneys—requiring four operations.*

This patient was operated on as follows: First operation, June, 1904, patent urachus excised; second operation, August, 1904, stone removed from right kidney; third operation, May, 1905, two stones removed from left kidney; fourth operation, December, 1906, coral stone removed from left kidney.

The patient now (April, 1908) seems to be in perfect health.

CASE II.—*Enormous stone in the juxtavesical, and a small stone in the vesical, portion of the right ureter; large perinephric abscess draining into ureter.*

The patient, a woman 33 years old, had suffered from renal colic on the right side which soon subsided into a constant pain with exacerbations at intervals. Other symptoms were chills, fever, frequent micturition, hæmaturia, pyuria, and tenderness over the right kidney and right iliac region. By vaginal examination a hard mass about as large as a hen's egg could be felt anterior and to the right of the uterine cervix. It was diagnosed as a stone in the ureter and was removed by incision through the vagina and ureter. The stone was whitish in color, irregularly spindle-shaped, measured 7 cm. (2¾ in.) in length, 11½ cm. (4½ in.) in circumference, and weighed 61 grams (915 grains)—the largest stone I have ever heard of having been found in the ureter.

Three weeks later a large perinephric abscess was opened. It was situated above and behind the kidney, which it had displaced downward. The abscess communicated with the ureter but did not communicate with the kidney so far as could be ascertained by careful examination of the kidney within and without.

CASE III.—*Pyelonephritis of left kidney and pyelitis of the right—probably of gonorrhœal origin; nephrectomy of left and drainage of right kidney.*

A man, 26 years old, had pain, vesical tenderness, frequent micturition and pyuria ever since an attack of gonorrhœa 4 years previous. The symptoms pointed to the left side chiefly. The left kidney was exposed, found to be a pus sac and was removed

with the ureter as far as the brim of the pelvis, the end of the ureter being stitched to the skin in inguinal region. Improvement followed, but 18 months later nephrostomy and drainage of the remaining kidney was done for six weeks. Great improvement followed and the patient regained his normal weight and returned to work after 2 years in hospital, but there is still pyuria.

NEPHROLITHIASIS.*

REPORT OF A CASE IN WHICH A RENAL CALCULUS WEIGHING ONE POUND AND TWO DRACHMS WAS SUCCESSFULLY REMOVED.

BY DAVID BARROW, M.D.,

OF LEXINGTON, KY.

THE kidney stone of the present report is of interest mainly on account of its size. Just after removal it weighed one pound and two drachms. It is the largest I have seen, and I am able to find but one reported as large, removed by operation (that described by Shields in the *Lancet,* October 15, 1904, which weighed 570 Gms.), although my search of the literature has not been exhaustive. In the St. Bartholomew Hospital Museum there is a stone, removed after death, which weighs 36½ ounces. It was taken from the right kidney, and from the left another was taken that weighed 9¾ ounces. The largest removed by Morris during life weighed 10 ounces, and he had made about one hundred operations for renal calculi up to 1898.

From a small piece of the stone Dr. Louis Heitzmann made the following report: "Was of a grayish-white color, brittle in character and indistinctly lamellated. Under the microscope it was found to consist of variously sized plates of triple phosphates, that is, ammonio-magnesian phosphates, as well as of simple, or calcium, phosphates, alternating with each other. Chemically it dissolved upon being treated with hydrochloric acid without effervescence. The nucleus of the stone was identical in structure with the body and the periphery. The diagnosis is: phosphatic calculus."

Wishing to preserve the specimen intact, the interior of the stone has not been examined, so I do not know the primary deposit, but beginning, as the history indicates, in early life, it seems probable that it is uric acid. The piece examined by

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* Read before the American Surgical Association, May 5, 1908.

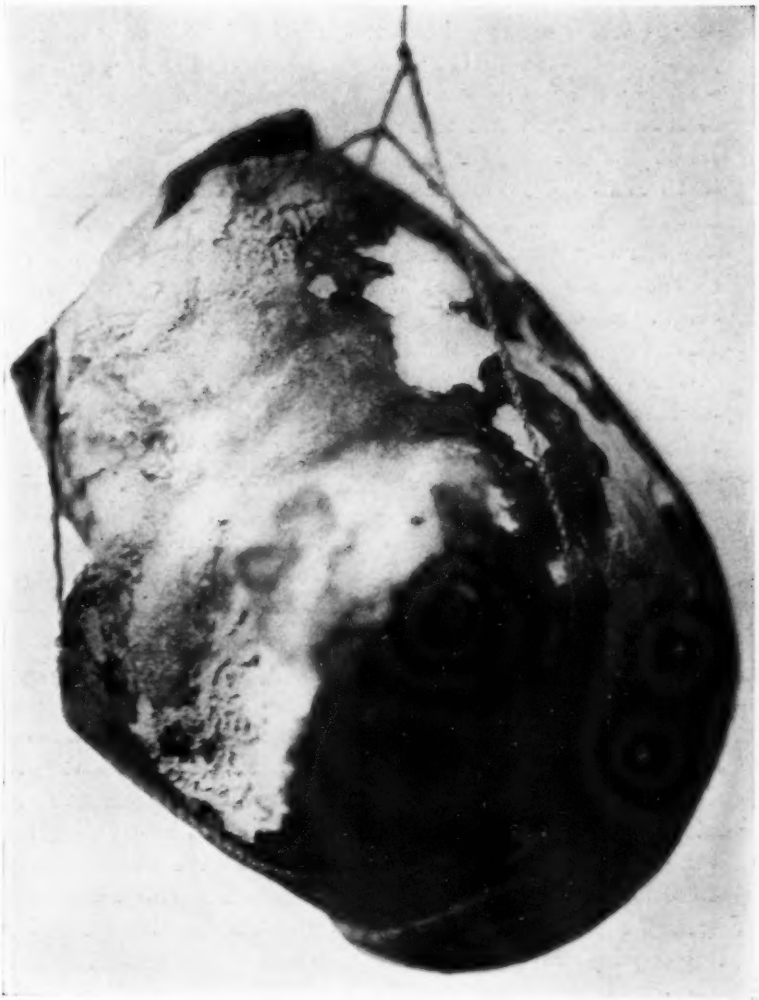
Dr. Heitzmann was peripheral and its composition throughout was identical, but the interior of that piece does not represent the nucleus of the main stone. With the primary uric acid deposit in time infection occurred, causing the secondary phosphatic deposits.

Mr. D. J. W., aged 48, a patient of Dr. F. M. Greene, of Lexington, Kentucky, consulted me in November, 1905. He stated that he had never been strong, that at the age of eight he had had the first symptoms of some abdominal trouble, and that since, for forty years, he had never felt well longer than a few months at a time. During boyhood he averaged three or four attacks a year, described the pain as being intense, in the region of the left kidney and lasting usually several days, always leaving the side sore and tender. At the age of fourteen, contracted "chills and fever," the type being irregular, which continued for one year, and were never controlled by quinine. After the chills and fever he improved in a general way, although he continued to have abdominal attacks every few months and was never strong or felt perfectly well. At the age of twenty, urinary symptoms appeared, and during the abdominal attacks he had to void urine as often as every half hour, at other times not so often, but always too frequently. Urination sometimes was quite painful, the urine often having a muddy appearance and causing an intense burning in the penis. For ten years the symptoms continued without much change, the abdominal attacks being slightly more frequent. During this period he was unable to attend to his duties (those of a farmer), except in a most indifferent way, and was never able to do hard manual labor without causing a return of the pain. At about thirty the attacks began to be more frequent, often recurring in a month, and in the intervals there was more abdominal soreness, greater weakness and more discomfort in getting about, and the urinary disturbance was nearly always present. A number of physicians had been consulted and had varied opinions as to the trouble, but strange to say, no one seemed to consider the kidney at fault, or at least, did not tell the patient so. He was given a great deal of medicine, and occasionally suffered so intensely that opiates had to be administered, but never to the extent of producing the habit. Ten years before consulting me, at the age of thirty-eight, he noticed for the first time an enlarge-

ment in the left abdominal cavity just below the ribs; it was round and about the size of an orange, and not very sensitive to manipulation. For these ten years he gradually lost ground, got very thin, suffered more pain, had more evidence of sepsis, urinary discomfort became almost continuous, and the tumor increased in size slowly. For four years he was practically an invalid, unable to do any work on the farm, was confined to bed much of the time, and was being treated by the X-rays, with the belief that the abdominal tumor was an enlarged spleen. He consulted me first at my office, and the following observations were made:

He was 5 feet 8 inches tall, weighed 120 pounds, his expression was anxious, complexion sallow, and there was every appearance of long suffering and ill health. He looked markedly septic, and told me that he had slight fever in the evenings; his pulse was over 100, and he suffered with short breath on slight exertion. An examination of the chest organs revealed nothing abnormal. In the abdominal cavity, to the left of the umbilicus and extending up to and under the border of the ribs, was a hard, oval tumor, about the size of a cocoanut. It was firmly fixed and was not affected by respiration, and there was but little pain on palpation. His bowels acted regularly, and at no time had he had any obstructive symptoms; the movements seemed normal and had never contained blood, but occasionally there was gaseous distention. The urine was normal in quantity, alkaline, and contained a large amount of pus and phosphatic debris; urination was frequent and painful, and a number of examinations for tubercle bacilli proved negative. There was no enlargement or tenderness of the right kidney, and at no time had there been any pain in the right side; an exploration of the bladder proved negative. There was no blood in the urine, and there was no history of ever having passed any. A diagnosis of pyonephrosis, probably of calculous origin, was made. He was sent to St. Joseph's Hospital, and operated upon December 16, 1905. After etherization, resting upon a loin pillow, an oblique incision was made from near the twelfth rib along the outer border of the erector spinæ muscle, curving forward a little above the crest of the ileum and Poupart's ligament. The tumor was firmly fixed and closely adherent to the perirenal tissues which were hard and indurated, but was enucleated without great difficulty. The calculus occupied the pelvis, and as there was great destruction of

FIG. 1.



Calculus, 4½x3¼ inches in dimensions, weighing one pound and two drachms, successfully removed, with the degenerated kidney.

the parenchyma of the kidney, a nephrectomy was done. The pedicle was transfixed and doubly ligated with silk, the ureter was traced for about three inches, ligated with chromic catgut and divided, so there was no escape of pus or soiling of the wound. The incision was closed with plain and chromic catgut, each layer being sutured separately; a rubber drain was inserted. The patient was but little shocked by the operation, and left the table in fair condition. The secretion of the urine was abundant, it soon cleared up, and in a few days analysis showed it to be normal, confirming the opinion that the right kidney was in good condition. Convalescence was satisfactory, but the drainage tract was rather slow to heal; at no time, however, was there anything to cause special anxiety. In seven weeks after the operation he left the hospital, completely healed and gaining in every way rapidly. At this time, now more than two years, he weighs 152 pounds, seems perfectly well, and works every day on the farm.

PRIMARY CARCINOMA OF THE FEMALE URETHRA.*

BY LEWIS S. McMURTRY, M.D.,
OF LOUISVILLE, KY.

THE literature of the subject is meagre and there is an absence of any detailed consideration of the same in the standard text-books on surgery and gynæcology. In 1898 but two cases were to be found in the Index Catalogue of the Surgeon-General's Office at Washington. The first systematic study of the subject, with investigation of the literature, was made by Melville Wassermann and published in Paris in 1895. Of the twenty-four cases reported by this writer a large proportion had been excluded because of the fact that the disease was not primarily of the urethra, but had its origin in adjacent structures. In many of Wassermann's series the diagnosis was not confirmed by microscopic examination. The meagre and imperfect observations of the early reports upon the subject led Alexander Skene in his comparatively recent treatise on gynæcology to declare that the existence of cancerous disease of the female urethra is doubted by many authors.

The first thorough and painstaking investigation of this subject was made in 1903 by Dr. J. F. Percy of Galesburg, Ill., and presented in a paper to the Chicago Gynæcological Society in that year. Dr. Percy made an analysis of the entire literature of the subject, and examined the original reports of cases accessible at that date. Percy's table of all recorded cases up to 1903 consisted of sixteen cases of unquestionable primary carcinoma of the female urethra.

The writer has made a diligent search of the literature in the Surgeon-General's Office in Washington to the present time, and has added eleven cases to the list as recorded by Percy. The entire list to date consists of twenty-seven cases.

He states that from inquiry among operative surgeons while investigating this subject he is led to believe that many cases have

* Abstract of paper presented to the American Surgical Association, May 5, 1908.

not been reported and that the disease is more common than the recorded list would indicate.

The writer reported two cases in which he has operated in the last three years. In both cases the disease originated in the urethra. Both were treated by complete excision of the urethra down to the sphincter muscle of the bladder. In one case the growth returned during the first year after operation and rapidly extended to the base of the bladder, the perivesical tissues and inguinal glands. No further operation was permitted. In the second case the pathological process was in its incipiency; the urethra was excised as indicated, prompt healing followed with perfect control of the bladder, and the patient continues without recurrence at the present time, one year after operation. Photomicrographs, showing the histologic changes in both cases were exhibited.

The writer claims that early diagnosis of carcinoma of the urethra of the female is difficult, because of the resemblance of the initial lesion, both as to appearance and symptoms, to urethral caruncle, a very common benign growth. He also called attention to the difficulty of differential diagnosis from certain syphilitic lesions which obtain in the same location.

The prognosis and treatment are the same as for carcinoma in other parts of the body. The great desideratum for successful treatment is habitual examination of all cases applying to the physician with painful micturition, early diagnosis of malignant types of disease, with complete excision in that early stage of invasion when permanent cure is possible.

PELVIC ABSCESS WITH SPECIAL REFERENCE TO RECTAL DRAINAGE.*

BY ARCHIBALD MacLAREN, M.D.,

OF ST. PAUL, MINN.

Professor of Clinical Surgery in the University of Minnesota.

THE problem of how to deal with pus in the pelvis has been practically solved in so far as the woman is concerned; all intraperitoneal collections of pus, with the exception of tubercular inflammations, whether from cellular tissue, appendages, uterus or appendix, can be cured by vaginal section, in the vast majority of cases.

Experience drawn from histories of 210 pelvic abscesses treated by vaginal section; reported in the *St. Paul Medical Journal* of Jan., 1908. Of this number 20 were recognized at the time of the original operation as due to suppurative perforative appendicitis and these were drained through the vagina and all temporarily cured by a simple vaginal section. Further observation has been, that not more than 20 per cent. of all pus cases, including pus-tubes and suppurating ovarian cysts, need more than a single vaginal section with the tube drainage and that at least five per cent. of the pelvic abscess cases were so perfectly cured that they were able to conceive and bear children.

In the pelvic abscess of men we have a slightly different problem, for here, to reach and drain Douglas' cul-de-sac we must go through the anterior rectal wall. The fear of increasing the infection or of further contaminating the abscess cavity has until now prevented giving a man the same chance as the woman. Many cases of pelvic appendiceal abscess in men and boys have been opened and drained in both sides, both loins, as well as having suprapubic stabs for large glass or metal tubes, and in spite of all these different drains have died of chronic sepsis or amyloid liver because the dependent portions of the peritoneum have not been drained. We all know that if these abscesses be left to themselves a certain number will perforate into the rectum

* Abstract of paper read before the American Surgical Association, May 6, 1908.

and cure themselves; if we take off the pressure in this abscess-cavity by opening it from above we lessen the chance of nature's best cure.

These pelvic abscesses in males are practically all due to perforative appendicitis. If we might be fortunate enough to see and recognize all acute cases of appendicitis before rupture of the appendix this question of rectal drainage would not be so important. After rupture the omentum and adhesive peritonitis usually wall off the pus and keep it in the right loin. The edge of the pelvic cavity is, however, very near, and in many cases the pus runs over into the true pelvis at the time of the rupture. Many others extend into the true pelvic cavity in the next few hours or days. Examine through the rectum every case of acute appendicitis before any operation: It is very important that the pelvic accumulations should be drained with a suprapubic drain followed by Fowler's position; reserving rectal drainage for the cases who later develop pelvic accumulations or convalesce badly after any course of treatment. Five cases reported: First case a simple rectal puncture, abscess opened, discharged several ounces of pus. Closed too soon but later opened of itself; discharged. Cured. Second case: overdistended the sphincter to prevent back pressure from the rectum into the abscess cavity, put in a winged rubber tube which extruded a couple of inches from the anus. Quick recovery. Third case: opened base of bladder by mistake, put finger in bladder to be sure that it was the bladder, left it open; then opened cul-de-sac and put in tube; no bladder trouble; coughed up pus from ruptured subdiaphragmatic abscess. In six weeks from time of first operation discharged cured. Fourth case: on tenth day found a bulging anterior rectal wall and made a rectal section, let out several ounces of thick offensive pus; showed considerable bleeding for several days; rise in temperature and pulse from blood infection; slow recovery. Fifth case, assisted Dr. H. P. Ritchie to operate acute perforative appendicitis on third day after perforation; on tenth day Dr. Ritchie put drain in rectum. Slow convalescence; ultimate perfect recovery. As will be noticed these cases are all of one type. I have advised them that they must come back later for removal of the appendix. There is another type which I have not operated upon, namely, the man who is desperately sick, and who presents a decided fulness in the cul-de-sac. In such a case

I will on my first opportunity simply open the cul-de-sac and drain and not make any anterior incision at all. Making the anterior incision later if necessary. I believe that this method will decrease the mortality of these abscess cases.

Operative Procedure.—The exaggerated lithotomy position (Pryor), the one usually used in making cystoscopic examination of the female bladder. The most important part of this position is the use of straps over the shoulder fastened to the uprights holding the feet, to prevent the shoulders sliding away when the head of the table is dropped. I have found that a weighted vaginal speculum will expose the anterior wall of the rectum fully as well as is usually done in vaginal section. One long-bladed retractor for the anterior wall is necessary to hold the bladder out of the way. The bladder having been catheterized, to prevent accident, then irrigate the rectum until fecal matter is removed, then sponge it out with alcohol. After the rectum has been well cleaned and the bulging anterior wall well located open the abscess with either long dissecting forceps or a tenaculum and long sharp-pointed scissors. After opening the cul-de-sac and letting out fluid, keep the scissors in place until a dilator can be passed upon them as a guide; then keep the dilator in place until one can pass a ¼ inch rubber winged tube well up into the cavity, then again dilate the sphincter.

Attention is called to a combination trocar and dilator for use in vaginal puncture; few blood vessels in vaginal section, but as shown in Case V, there is some danger of hemorrhage following rectal section. Vaginal section is blind, does not give sufficient room for further exploration. But in rectal, all that is necessary is an opening through which to pass a drainage-tube into the cul-de-sac of Douglas.

TREATMENT OF FRACTURES OF THE FEMUR.*

EXTENSION MADE FROM TRACTION BELOW THE KNEE OF THE INJURED, AND COUNTER-EXTENSION THROUGH A SIMILAR POSITION FROM THE IMMOBILIZED UNINJURED LIMB.

BY OSCAR H. ALLIS, M.D.,

OF PHILADELPHIA,

Surgeon to the Presbyterian Hospital.

FRACTURES were probably among the first accidents to demand sympathy and skill in the human race, and with this sympathy and skill constantly and universally in demand through all the centuries that have passed, it is hardly to be supposed that any new principle will ever be evolved. The most brilliant and modern of all, the open method, while it possesses all the advantages of exactitude and precision, is hardly likely, even with the assurance of absolute safety, ever to become the accepted method even in hospitals where its advantages can be most readily attained.

One of the first and most obvious demands in fracture of the thigh-bone is a provision for continuous and prolonged recumbency, and for this purpose fracture-beds have been contrived. These beds have engrossed the attention and elicited the combined inventive genius of lay and professional minds until they supply almost every conceivable want and add greatly to the ease of nursing and comfort of the patient, and yet, strange as it may seem, there is scarcely a hospital in Christendom that has a fracture-bed. There are many good reasons for the surgeon's aversion to fracture-beds, but there are equally cogent reasons why they should be used and it would not surprise the writer to see them resume their place as a necessary adjunct to the surgeon's requirements.

In fractures of the femur attention must always be directed to three untoward tendencies, viz., to rotation, angula-

* Read by title before the American Surgical Association May, 1908.

tion, and shortening,—three serious defects, any one of which if pronounced is attended with crippling results, and for whose correction scores of ingenious apparatuses have been devised, but each in turn to be found untrustworthy and disappointing.

Of the three tendencies to deformity, that of shortening has given the most trouble and has elicited the greatest skill. While the various appliances are legion, all the methods of extension can be arranged under two heads; in the first the two fragments are treated by different parts of the same apparatus, in the other an element is introduced wholly independent of the apparatus.

Under the first head I may mention the long splint, the upper end of which was attached to the trunk by means of straps, bandages and perineal bands to provide for counter-extension, while extension was obtained by drawing down the parts connected with the lower fragments and securing them to the lower end of the splint. This simple device was elaborated by the attachments to the upper part—a bent iron shoulder-piece (Hodge) and a foot-piece with adjustable slot and graduating screws, but the fact that the lower end of the apparatus must extend several inches beyond the ends of the patient's feet, made the apparatus impracticable under ordinary circumstances and has driven a most admirable contrivance entirely out of existence.

The principle aimed at in the use of the long splint was afterwards attained by the employment of plaster of Paris. This was applied to the trunk and pelvis with a view to provide for counterextension, and then during extension was continued down the thigh covering in the entire extremity. This had the advantage of compactness and simplicity, but experience soon developed the fact that the counterextension was irksome and called for so many points of relief that the final results revealed a degree of disappointment that dampened the ardor of its early advocates and has left this as a mode of treatment to only a few who still feel that it offers the best means at our disposal for dealing with this formidable accident.

To overcome the tendency to angular deformity the

double inclined plane was devised. Upon this instrument was lavished all the skill of the mechanician—carved splints, extension pieces, adjustable joints with ratchets to establish fixation at any point, foot-pieces with extension plates and screws. But the final verdict was that no better results were attained than by simpler devices, and this theoretically perfect instrument sank slowly but surely to unmerited obscurity. It is still described in text-books, and very properly so, not with a view to recommending its use but rather to show what has been attempted in that line and why it has failed.

Of the second variety is the method of Buck in which gravity is used as the extending agent through pulley and weight attached by means of adhesive plaster to the parts below the seat of fracture. It is the simplest method, has enjoyed the greatest popularity and is still employed in many of our largest hospitals. So far as results are concerned there is really but little choice between methods. Within a couple of weeks from the reception of the accident the pain at the seat of the injury measurably abates and from this time on the restlessness of the patient may defeat the efforts of the most skilful surgeon with the most perfectly devised apparatus. One of the most common and glaring abuses of Buck's extension is the sliding down in the bed until the patient's foot rests against the foot-board of the bed. To prevent this the foot of the bed is raised, but rarely with any good result and the final result, with the best apparatus and the most skilful surgeon, shows that the best directed efforts may be thwarted by unruly and ungovernable patients.

In my treatment of fractures of the thigh-bone I have for many years been in the habit in selected cases of making the sound limb act as a splint and a means of counterextension to the injured one. I first began the practice in young children. Having first carefully enveloped the entire sound limb in protection it was enveloped in plaster of Paris. A similar course was pursued with the injured limb except that the plaster of Paris did not extend above the knee. The plaster was now permitted to set and get perfectly hard, after which

extension was made and when the two limbs were in symmetrical position a plaster bandage was made to bind both feet and legs together. With such a simple dressing I have had no further trouble throughout the entire treatment and in some instances have attained results with no ascertainable defect.

FIG. 1.

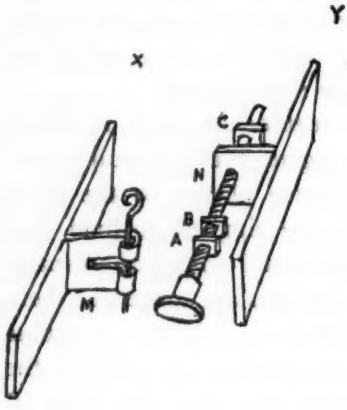


FIG. 2.

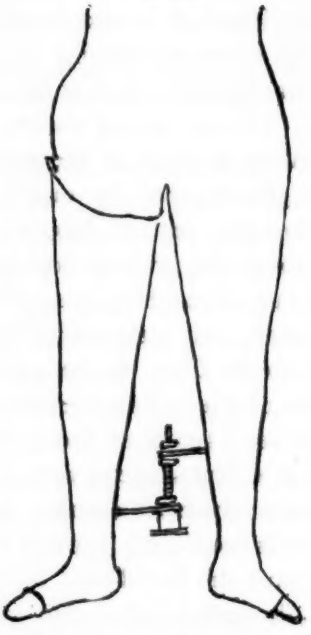


Fig. 1.—The parallel plates X Y made of iron ¼ in. thick, 3 in. wide, 6 in. long. The attached pieces M N are about 3 inches long; M has a slot in it; N has a thread for the bolt. The nuts A B C are for fixation after the requisite amount of extension and rotation has been made.

Fig. 2.—The apparatus has been incorporated by means of a plaster bandage with the cast. The inequalities of the limbs have been overcome and the nuts tightened.

The reason for putting each limb in plaster separately and letting the plaster harden before binding them together is that after the first has fully hardened there is no danger of applying the final bandage so tightly as to make pressure sores possible.

In applying such a dressing to an adult I have found the resistance to extension even under ether, quite as much

as a strong man could overcome and in one instance the plaster cast shifted its position and produced a pressure sore.

To obviate the necessity of administering an anæsthetic, or depending upon an assistant to make traction, I have employed an apparatus illustrated in Figs. 1 and 2. The traction is so gradual, so firm and irresistible, that the patient hardly experiences any pain; while the satisfaction of comparison as the extension is being made is very great. Should there be any change in the relation of the casts and a slight shortening take place, a few turns of the connecting bolt will at any time rectify it. This apparatus is not confining; it will not prevent the patient from working down in bed until his feet rest against the foot-board, but both feet and both extremities must move in parallel lines and this change of posture will not affect the symmetry of the limbs. With this apparatus I have obtained union without appreciable shortening in a fracture of the neck of the femur partly within and partly without the capsule that immediately after the accident presented a shortening of an inch and a half. As a simple inexpensive and effective appliance for treating fractures of the femur I cannot too strongly urge it upon those whose patients are at a distance and cannot be seen daily.

One point in the dressing that I have regarded with special favor, is that while extension and rotation are provided for in the bolt and nuts, the apparatus does not conceal the injured limb. Hence any angulation laterally or any tendency to forward projection of the upper fragment can be readily detected as the swelling subsides, and minimized if not entirely corrected by appropriate measures.

This means of traction and fixation will be found most advantageous as a preliminary step to nailing or screwing the fragments together in delayed and imperfect union in intracapsular fracture of the neck of the femur.

MODERN MEDICINE AND SURGERY IN THE ORIENT.*

BY J. EWING MEARS, M.D.,
OF PHILADELPHIA, PA.

In Japan education in medicine is a part of the general system, which is as complete in its development as may be found in any country of the world. The educational centre is Tokyo, where one of the great universities of Japan is located, the other being Kyoto. Of the one hundred and thirty-one professors in the University of Tokyo, the College of Medicine has twenty-four with four or five hundred students. There are two hospitals connected with the college, having a total capacity of five hundred and seventy-one beds.

In addition to the College of Medicine of the University there are in Japan eight other medical colleges. Foreign physicians, who are graduates of medical colleges having a reputable standing, will on application be granted a license to practise. There are a number of hospitals in addition to those connected with the medical colleges.

There is a training school for nurses connected with the Red Cross Hospital. They receive a very practical instruction by lectures and demonstrations, and are made nurses and not half doctors. They serve an apprenticeship of three years. A graduate nurse in private practice receives from fifty to seventy-five cents a day.

In no other part of the world is the Red Cross Society so perfectly organized or so efficiently equipped. The Society owns two hospital ships. It is the largest in membership as well as the richest Red Cross organization in the world.

Japan also has a well equipped school for the instruction of its medical military officers. Massage is practised generally among Japanese people.

Japan undoubtedly takes the first place in the Orient in all that relates to the adoption and cultivation of modern scientific medicine.

* Abstract of a paper read by title at the meeting of the American Surgical Association, May 5, 1908.

In China, outside of the few hospitals and fewer medical colleges connected with them under British or American control, modern medical science does not have a very firm foothold.

The Canton Hospital, which was opened in 1835 by Dr. Kerr, a missionary, has had a place in the records of surgery for many years by reason of the large number of cases of vesical calculi operated for by Dr. Kerr. In Canton, as is well known, the sanitary regulations are not enforced, but, in marked contrast to the conditions in Canton, one sees much in Shanghai which gives evidence of the influence of Western civilization, especially outside of the Chinese part of the city. There are four hospitals. In considering the state of modern medicine in China, it is necessary to bear in mind that it has reached its highest development in those cities in which there is a large foreign population.

In India, Bombay is the seat of the Grant Memorial College, the largest of the four medical colleges of the country. Connected with the colleges are hospitals used in conducting clinical and laboratory instruction. The teachers in the colleges and the staffs of the hospitals are taken from the medical officers of the Indian Military Service. The medical colleges are in affiliation with the universities which constitute the head of the educational system carried on by the British Government. Very few Mohammedans enter the medical profession. The Government, with all its power, refrains, except in extreme conditions, from the enactment and the execution of various desirable laws and sanitary regulations calculated to disturb the uneasy sensibilities of the natives.

As to the plague in India, inoculation is gaining favor, and it is believed that before very long opposition to its practice by the native population will be generally overcome. In Bombay Dr. Mears was informed that but two varieties of plague rats had been identified—*Mus Rattus* and *Mus Decumanus*. Since his return, in studying the reports from San Francisco of the Marine Hospital Service, he notices the statement that in addition to these there have been identified the *Mus Alexandrus* and *Mus Musculus*. Dr. Mears found the homes for lepers in various cities in India of much interest.

TRANSACTIONS

OF THE

AMERICAN SURGICAL ASSOCIATION.

Annual Meeting held at Richmond, Va., May 4, 5 and 6, 1908.

The President, WILLIAM H. CARMALT, in the Chair.

I. ADDRESS OF THE PRESIDENT.

DR. WILLIAM H. CARMALT, of New Haven, Conn., the president, referred to the advance in medical science, particularly in pathological anatomy, during the last half century brought about especially by the greater facilities of surgical technic. The discoveries of anæsthesia and asepsis paved the way to early operations and thereby at once opened a new field, giving the opportunity to early observations of pathological processes. Instead of operations as a last resort to obviate impending death, they are now largely undertaken for distinctly therapeutic purposes. The local character of the initial stage of tuberculosis was cited and its transference from internal medicine to surgery remarked upon. Tuberculous peritonitis was cited as a striking instance. The knowledge gained of the internal secretions, as shown in operations on the thyroid gland, was obtained almost exclusively by surgeons. The very recent investigations on the parathyroids are instances of physiological and pathological advancement obtained altogether by surgical activity. The relations of pancreatitis to gall-bladder diseases and the pathology of chronic diverticulitis of the sigmoid are further instances of the debts of the pathological anatomist to the surgeon. The establishment of fully equipped pathological laboratories in hospitals was strongly urged and the advantages to the hospital of clinical teaching in its wards insisted upon.

II. THE EARLY DAYS OF THE AMERICAN SURGICAL ASSOCIATION.

DR. J. EWING MEARS, of Philadelphia, delivered this address, for which see page 833.

III. SURGERY OF THE GASSERIAN GANGLION.

Dr. Stephen H. Weeks, of Portland, Me., read a paper in which he gave an opinion that the removal of the Gasserian ganglion as a primary operation for the relief of tic douloureux is not justifiable, but that the extracranial operations upon the branches of the fifth cranial nerve should be first made. The osteoplastic flap in the temporal region called the Hartley-Krause operation is the one Dr. Weeks employs. A pint of normal salt solution with an ounce of brandy should be injected into the rectum about half an hour before the operation commences. In all his operations on the brain he has used ether. In the operation the second and third divisions are put upon the stretch with the blunt hook and divided close to the foramen rotundum and foramen ovale respectively. He dissects them back to the ganglion and lifts the ganglion from its bed by making traction on the inferior maxillary nerve, having first divided the superior maxillary nerve and removed the parts of the ganglion corresponding to these various divisions, leaving untouched the first division, with its corresponding portion of the ganglion. If the first division of the nerve and its corresponding portion of the ganglion be retained there will be no danger to the eye, and the only protection needed to the eye will be a simple compress and bandage. Sometimes the dura mater is considerably torn and the cerebrospinal fluid escapes during the manipulation of the brain. Dr. Weeks has seen no bad results follow this. On the contrary, it has seemed to be an advantage, as it allows the lifting of the temporosphenoidal lobe more freely from the middle fossa, giving a better view of the ganglion and its nerves. In his last case when the dura was dissected from the ganglion, though quite a little brain matter escaped, no unpleasant symptoms followed. The mortality of the operation thus far in his hands has been nil. He has operated four times.

IV. TREATMENT OF ACUTE GENERAL PERFORATIVE PERITONITIS.

Dr. John B. Murphy, of Chicago, presented a paper upon this subject, for abstract of which see page 870.

Dr. John B. Deaver, of Philadelphia, emphasized the necessity of attacking the condition early and of doing as little as possible in the matter of manipulation. He has no hesitancy in

reopening the abdomen for obstruction. In ten consecutive cases all recovered. Short anæsthesia he regards as important. He uses eserin reinforced with strychnia. In some cases there has been slight cardiac disturbance from the eserin. He has no hesitation in setting his patients up in bed. Concerning the giving of morphia, he "does not know what a hypodermic syringe looks like for the purpose of giving morphia."

Dr. Arpad G. Gerster, of New York, within the last two years in his hospital service has abandoned methods of irrigation and mopping formerly employed and has followed the plan laid down by Dr. Murphy, with the Fowler position, and the results have been markedly improved. He has used eserin in the treatment of tympanitis following diffuse peritonitis, but is not so enthusiastic concerning the results as some are. Contributory to the improved results in the treatment of general peritonitis are the facts of improved technic, early recognition of cases and the inclusion in the group of general peritonitis of cases easily cured by proper treatment. He described a simple modification of the enemata by which the irrigating rectal injection is carried high into the rectum and after being allowed to escape, repeated. Peristalsis is thus provoked and large quantities of gas made to escape. He finds this method more effective than the use of eserin, and being a mechanical procedure it may be safely left in the hands of the nurse. He thinks Dr. Deaver's stand in regard to the giving of morphia an extreme one. While the excessive administration of morphia is wrong, the entire withholding of it he regards as unnecessary and cruel.

Dr. Arthur D. Bevan, of Chicago, in some cases of fluid in the peritoneal cavity employs a female glass catheter, using it as a pipette, taking up the pus not only in the cul-de-sac but in other directions. Many cases in which there is free pus, and cases of duodenal ulcer operated upon early in which there is a considerable amount of fluid, are regarded by him as cases in which general peritonitis has been prevented by early interference, and not cases of general peritonitis. This obviously has a determining influence upon statistics. He has found nitrous oxide gas of much value as an anæsthetic. Frequently the giving of either ether or chloroform in these cases turns the scale between recovery and death. He disagrees with Dr. Murphy regarding the danger of washing out the peritoneal cavity, believing that irrigation is good surgery and that it can be done without loss

of time. In the matter of drainage he favors the large cigarette drains in preference to rubber tubing.

Dr. Dudley P. Allen, of Cleveland, agrees with Dr. Bevan that the washing out of septic material from the peritoneal cavity is a valuable aid in treatment. He places the patient on the side when draining to have the aid of gravity and limits the washing to the area involved.

Dr. Joseph Ransohoff, of Cincinnati, feared that if the dictum went out to the general profession that free general peritonitis recovers in the proportion of 44 to 3, the average practitioner would delay in seeking surgical aid with the thought in mind that if the patient did get worse he had 44 out of 47 chances of getting well. He asked Dr. Murphy in closing to state in how many of the 47 cases the operation was done after four or five days subsequent to the development of symptoms of general peritonitis and in how many cases he operated in which death seemed imminent.

He called attention to the general use of the word peritonitis, suggesting that but few understand by the term exactly the same thing. Free fluid in the peritoneum is not necessarily infected and its presence should not be regarded as evidence of peritonitis until cultures show infection.

Dr. Algernon T. Bristow, of Brooklyn, showed a device with which he regulates the passage of the fluid to about 90 drops per minute in rectal irrigation.

Dr. George E. Armstrong, of Montreal, has followed the teaching of Dr. Murphy in the treatment of peritonitis with very great improvement in results. He attaches great importance to induced drainage by rectal injection in the sitting position. In two cases recently under his care with persistent vomiting and with swelling in the epigastric region, he thinking the condition due to retromesenteric pressure on the transverse duodenum, reversed the position of the patients from the Fowler to the Trendelenburg with satisfactory results.

Dr. John C. Oliver, of Cincinnati, inquired of Dr. Murphy whether his method of treatment had been applied to gunshot wounds of the abdomen, especially to those cases in which injury had been inflicted several hours before operation. He asked because, while there might be an honest difference of opinion concerning the forms of peritonitis following appendicitis or per-

forated gastric or duodenal ulcer, all agree that the form of peritonitis following gunshot wounds is apt to be general. Therefore, the results of treatment in that class would be of value.

Dr. James E. Moore, of Minneapolis, said he had no word of criticism of Dr. Murphy's paper, wishing only that he was able by any means to secure results so good. He protested against the dictum laid down by Dr. Deaver that abdominal cases should be deprived of morphia. In the beginning of his abdominal surgery he had withheld morphia, but after having had an operation upon himself he insisted upon having morphia. He has since given it to his patients and his results are improved.

Dr. Maurice H. Richardson, of Boston, said that peritonitis still remains the most important disease with which he has to deal, causing more deaths in his own cases, those of his colleagues, and in literature, than any other disease. He referred to the evolution in treatment from the time when a man's abdomen was made to look like a colander to the present, when a small incision and very little disturbance of the abdominal viscera are the rule. He could criticize only in the most favorable way Dr. Murphy's method. In his hospital service he does not know that they use the method exactly, though they do not disturb things very much. They do not wash out. They do not wipe extensively. They do not make multiple incisions. They depend upon rectal lavage, and rather than have patients toss all night they give small doses of morphia.

Dr. John B. Roberts, of Philadelphia, said that Dr. Murphy's paper disproved effectually the oft-repeated statements of those operators who for years have contended that all cases of perforative appendicitis and similar lesions should be treated by an *insistent* search for the offending organ. Also, it has shown effectively their error in believing that patients after abdominal section or with peritonitis from perforation should be tortured by persistent immobility in the dorsal recumbent position, by absolute deprivation of water, and by the ante- and postoperative withholding of morphia and pain obtunding drugs. Dr. Murphy's results thus justified those who for twenty years have contended against such surgery.

Dr. Richard H. Harte, of Philadelphia, thought it obvious that no hard and fast rules could be laid down in the treatment of peritonitis, each case being treated rather according to the con-

ditions found. He thought error sometimes existed in the use of rectal irrigation in not having the tube of sufficient size and held at a proper height to favor the ready flow of the fluid toward the bowel. He described a frame made to support the weight of the patient by the buttocks and thighs as a satisfactory method of maintaining the Fowler position. He approves the plan of having patients sit up even in the typhoid perforation cases in which the perforation occurs at the end of a very long illness. He favors gauze for drainage rather than tubes.

DR. M. L. HARRIS, of Chicago, has tried repeatedly the principles laid down by Dr. Murphy and his patients get well. Relative to the inquiry of Dr. Allen concerning gunshot wounds of the abdomen, he had had within a few months 17 cases of these wounds involving the intestines in which there were from one to eight perforations. Every case was operated upon early, all were drained and all recovered.

MR. G. B. A. MOYNIHAN, of Leeds, England, said that at the Leeds' Infirmary they grouped their cases according to those occurring previous to their having learned of Dr. Murphy's treatment, and those occurring subsequently. Those of the former group they had been accustomed to lose. Those of the latter usually recovered. Only in very insignificant particulars do they vary from the method laid down by Dr. Murphy. They operate in the least possible time. In drainage employ a large sized rubber tube split along the wall of one side which when in position drains along its whole length and can collapse if pressure from tissue occurs. He takes issue with Dr. Deaver in the matter of morphia, a small hypodermic being given in every case before the patient leaves the operating table. No house physician, however, is allowed to repeat the dose without instruction from his superior officer. They usually do not employ general anæsthesia, but operate under lumbar anæsthesia by stovaine. An advantage of this method is the passing of abundant quantities of flatus. This makes the operation distinctly easier. The patients are placed in bed in an exaggerated Fowler position. The position is maintained by a bolster beneath the buttocks and thighs attached by straps to the head of the bed. No restraint is put upon the amount of water the patient desires to take, for the nurse leaves a vessel containing water on the table beside the bed.

DR. MURPHY, in closing, emphasized his positive conviction

that every case of general perforative peritonitis ought to get well if properly handled. Such handling, however, involves timely action, intelligent action, and the following of definite lines to results. Answering Dr. Ransohoff's question, he said he did not have any cases four or five days old, and trusted he never would have. All of his cases were under 40 hours. All cases should be under 24 hours, and under 12 would be better. When surgeons appreciate this fact the same results as seen in early operations for appendicitis will obtain in peritonitis. Dr. Murphy does not make the differentiation of Dr. Bevan between the type of cases with intestinal leakage without peritoneal inflammation, and the type with intestinal leakage with peritoneal inflammation. The presence of a yellow creamy fluid in the peritoneum does not constitute peritonitis. There must be a perforation of the canal and a direct communication from the lumen of the canal into the free peritoneal cavity. The free yellow creamy fluid is often a conservative fluid carrying away infective organisms. The short duration of the anæsthesia as brought out by Dr. Bevan he regards as important and the operation under nitrous oxide is to be desired. The 48 cases reported included every case of general suppurative perforating peritonitis coming under his observation and were not elected cases.

V. LATE RESULTS AFTER OPERATIONS FOR BENIGN DISEASES OF THE STOMACH AND DUODENUM.

Papers on this subject were read by Mr. MOYNIHAN, of Leeds, Eng., and by Drs. W. J. MAYO, of Rochester, Minn., and JOHN B. DEAVER, of Philadelphia, Pa. For these papers see pages 873, 885, 894.

DR. WILLY MEYER, of New York, spoke of the complications following operations for stenosis of the pylorus and of the possible overcoming of these. A patient under his care had passed on the third day of convalescence into a deep coma, passing the stools and urine in the bed. Temperature and pulse showed no reason for the condition. The patient was given regularly every eight hours a hypodermoclysis of salines. On the fifteenth day he regained consciousness and went on to proper convalescence. In the secondary operation he prefers gastro-enterostomy plus enterostomy to the short loop.

DR. JOHN H. GIBBON, of Philadelphia, inquired as to the

occurrence of peptic ulcer of the jejunum as a sequel to gastro-enterostomy. In the absence of its mention in a report of over a thousand cases it would seem to be unusual.

Dr. George W. Crile, of Cleveland, referred to the possibility of rendering an unsurgical case surgical by direct transfusion of blood at the time of operation.

Dr. J. M. T. Finney, of Baltimore, has employed pyloroplasty for pyloric obstruction 48 times since 1903. Of these cases four have died. Autopsy showed the cause of death to be other than the operation. From the observations concerning gastro-enterostomy it would seem unreasonable to anticipate untoward results that have not yet manifested themselves. He regards the personal equation a determining factor in the choice of operations. Personally he gets better results with pyloroplasty. Except in a few nervous cases his results have been perfectly satisfactory. He endorses resection in doubtful cases of ulcer. In inflammatory pyloric stenosis he believes pyloroplasty definitely contraindicated, and that gastro-enterostomy should be employed.

Dr. John C. Munro, of Boston, said that an analysis some years ago of hospital cases showed that less than 20 per cent. of operated gastric ulcer cases had been failures. All of the cases were grouped under the long loop, double loop and short loop. Some of the results could be definitely traced to the difference in technic. Since that time the Finney operation had been employed almost exclusively.

Dr. Leonard Freeman, of Denver, spoke of his satisfactory employment of linen thread for the hæmostatic suture in from 50 to 55 gastro-enterostomies and related an experience emphasizing the necessity of examining from time to time the character of the catgut employed.

Mr. B. G. A. Moynihan said that he used the posterior, no loop operation, making the anastomosis as close as possible to the beginning of the jejunum. He regards the point of importance to be not so much the direction of the jejunum as its application to the stomach in such a way that it lies easily. With mimicry so close that it is difficult to distinguish between ulcer and carcinoma, the ulcer should be excised. He appreciates the difficulty of its excision when it lies up on the lesser curvature. He attributes postoperative regurgitant vomiting of bile to a mechanical defect at operation.

He has had one case of peptic ulcer subsequent to posterior gastro-enterostomy. He has collected and will publish a report of 60 cases of peptic jejunal ulcer following gastro-enterostomy.

Dr. W. J. Mayo, in closing, referred to the fact brought out that there could be secured not less than 80 per cent. of permanent recoveries in gastric ulcers in which medical treatment had failed and that something less than 10 per cent. more will be improved. The real difficulty in cases reported to be worse because of gastro-enterostomies he thinks lies in the fact that the medical diagnosis has not been confirmed at the operating table; and, because the operation has been done upon cases in which it should not have been done, the internist assumes the position that the cases are worse as the result of the operation. They have done the Rodman operation over twenty times. Rather than ask the medical man to turn over to him early cases of gastric ulcer, the surgeon should ask that he turn over cases of tumor the character of which he is waiting to determine. In these cases the surgeon can do better than the medical man if they are not malignant. If they are malignant it will put into the surgeon's hands a considerable number of malignant cases in time to cure them.

VI. LIABILITY OF GASTRIC ULCERS TO BECOME CARCINOMA.

Dr. William L. Rodman, of Philadelphia, read a paper with this title, for abstract of which see page 922.

VII. GASTRIC AND DUODENAL ULCERS SECONDARY TO WOUNDS OF THE URINARY BLADDER.

Dr. John B. Roberts, of Philadelphia, read a paper with this title for which see page 924.

Dr. John E. Summers, Jr., of Omaha, inclined to the belief that trauma is the cause of postoperative gastric and intestinal hemorrhage.

Dr. William L. Rodman, of Philadelphia, dissented from the belief of Dr. Summers that postoperative hæmatemesis is due to trauma. His belief is based upon observations made upon dogs and inquiries of colleagues. He thinks the most rational explanation is that suggested by Dr. Roberts that it is due to sepsis. He has used Pagenstecher's thread for the inner stitch in gastro-

enterostomy, but in one case there was furious hemorrhage. Copious vomiting occurred and in one large vomited clot there was the Pagenstecher suture. He questions therefore whether it is well to use a Pagenstecher suture or a well chromicized gut.

VIII. CONGENITAL HYPERTROPHIC STENOSIS OF PYLORUS.

Dr. Frank E. Bunts, of Cleveland, read a paper with this title, for abstract of which see page 946.

Dr. John C. Oliver, of Cincinnati, said that he had seen within the past two years four cases of congenital stenosis operated upon by gastro-enterostomy. Two were his own cases; two those of his colleagues. In one of the cases (a female infant) the symptoms appeared at two weeks of age. There was a distinct family history of stomach trouble for three generations. The mother of this child during her pregnancy developed tuberculosis of the glands at the back of the neck. The mesenteric gland of the child showed an early stage of tuberculosis.

Dr. Francis J. Shepherd, of Montreal, did a pyloroplasty upon a child three weeks of age. The child is now 18 months old and in perfect health.

IX. STONE IN THE KIDNEY; TUBERCULOSIS OF THE KIDNEY; PERINEPHRIC ABSCESS.

Dr. George Tully Vaughan, of Washington, D. C., read a paper with this title, for abstract of which see page 1024.

X. THE DIAGNOSIS AND TREATMENT OF KIDNEY STONE.

Dr. Arthur Dean Bevan, of Chicago, said that a diagnosis of stone in the kidney was to be arrived at by a process of exclusion, confirmed by the X-ray. When the diagnosis is definite the treatment should be surgical removal except in cases of small stones which may be passed, or in cases of extreme age, or in the presence of organic lesions which strongly contraindicate operation. In single stone in the pelvis of a comparatively sound kidney the operation of pyelotomy with closure is the operation of choice. In cases with large stones, and especially multiple stones in both pelvis and calyces, and in cases with considerable infection, nephrolithotomy with or without drainage should be resorted to. In cases in which stones are found in a kidney

which is so altered as to be of little value to the patient, and where kidney sufficiency has been demonstrated, and the other kidney is not involved, primary nephrectomy should be done. In primary stones involving but one kidney, pyelotomy and nephrolithotomy are comparatively safe procedures, carrying with them but 3 to 4 per cent. of risk. When both kidneys contain calculi the dangers of the pathological condition and the operation for its relief naturally increase. Where because of infection and destructive processes nephrectomy is required the dangers of the operation will depend upon the integrity of the other kidney and its functional capacity and the dangers resultant upon the surgical removal of the diseased organ. In Dr. Bevan's own series of 52 operations done for kidney stone there was but one death from nephrolithotomy and two deaths from secondary nephrectomies. Both operations were extremely difficult because of the necessity of digging the kidney remnant out of dense scar tissue due to long-standing perinephric inflammation.

XI. A LARGE KIDNEY STONE.

Dr. David Barrow, of Lexington, Kentucky, exhibited a large kidney stone weighing one pound and two drachms. For this paper see page 1028.

XII. RESULTS OF OPERATION ON THE KIDNEY FOR CALCULUS AND TUBERCULOSIS.

Dr. Andrew J. McCosh, of New York, presented this paper, the object of which was to trace first the future life-history of patients from whom in past years a tubercular kidney had been removed. See abstract on page 1022.

XIII. THE DIAGNOSIS AND PROGNOSIS OF TUBERCULOSIS AND SEPTIC CONDITIONS OF THE KIDNEY.

Dr. George E. Armstrong, of Montreal, read a paper with this title.

XIV. ACUTE UNILATERAL HÆMATOGENOUS INFECTIONS OF THE KIDNEY.

Dr. George Emerson Brewer, of New York, read a paper in which he called attention to the early stage of this disease,

stating that the condition is not as a rule recognized by the profession. Nine cases were referred to, admitted to the Roosevelt Hospital during the past four years, of which only one came in with the correct diagnosis. A number of instances are given in which patients presented almost typical symptoms of appendicitis or cholecystitis, and under this mistaken diagnosis were subjected to operation exposing the gall-bladder or appendix. The writer divided the cases into three groups. In the first, or severest type of the disease, the symptoms are often ushered in by a chill. Mild surgical measures are of no avail. In the second, or intermediary group, the patients present symptoms often quite as severe as those of the first group, but the evidences of grave and progressive toxæmia are wanting. In these cases decapsulation of the kidney with the opening and drainage of visible areas of necrosis or suppuration, often leads to recovery, although a chronic nephritis may persist. Six cases of this type are reported treated in this manner with satisfactory recoveries. The third group comprises the mildest type of the disease. This requires no operation and is of surgical interest only because it accounts for certain cases observed by all surgeons in which, after a fairly characteristic history of a subacute attack of appendicitis or cholecystitis, operation reveals no lesion or sign of recent inflammation. The one pathognomonic sign present in all cases is a marked unilateral costovertebral tenderness.

DISCUSSION ON SURGICAL AFFECTIONS OF THE KIDNEY.

Dr. Leonard Freeman, of Denver, in operating for stone in the kidney prefers to cut through the parenchyma of the kidney. He finds that bleeding is easily controlled by grasping the vessels with gastro-enterostomy forceps with the flexible blades covered with rubber. He exhibited an X-ray picture showing shadows resembling calculi in the ureter which were spoken of by Dr. Bevan as probably calcifications of the ligaments of the pelvis. Dr. Freeman thinks they might also be classified as calcified lymphatic glands, or phleboliths. Another X-ray picture revealed a cured tuberculosis of the bladder.

Dr. George E. Brewer, of New York, said that as a matter of fact, there are no symptoms absolutely pathognomonic of stone in the kidney. Of all the signs and helps he was of opinion that the X-ray is the most important. An absolutely good plate, how-

ever, must be insisted upon. The small points shown over the ureter are one source of error. The majority of these shadows mistaken for stone he thinks are calcareous bodies. Another source of error was illustrated in a case of a man with history of renal trouble in which the X-ray showed a shadow perfectly distinct over the region of the kidney almost as large as an English walnut and with perfectly defined edges. This proved to be a kidney absolutely destroyed by tuberculosis.

Dr. Nathan Jacobson, of Syracuse, spoke of the value of the confirmatory test of the X-ray in cases of renal stone and showed a number of plates illustrating oxalate of lime, phosphatic and uric acid stones. He related a rare case in which treatment had been given by one of his confrères for cystitis. Dr. Jacobson operated, and upon doing a perineal section a complete incrustation of the bladder wall was discovered. The child did well until anuria developed, and death followed. Autopsy showed both kidneys absolutely filled with stone.

Dr. C. B. G. Nancrède, of Ann Arbor, warned against making a diagnosis of stone in the ureter or kidney by the X-ray alone and described a case in which diagnosis based upon the X-ray was totally wrong. He asked Dr. Bevan whether in the small percentage of failures to find the stone in the kidney or ureter by the X-ray the composition of the stone was determined. He had recently removed from the bladder quite a large stone which was entirely uric acid. He has never seen such a one in the kidney or ureter. Several X-ray plates showed not the slightest trace of the uric acid stone removed from the bladder.

Dr. Ellsworth Eliot, Jr., of New York, confirmed the statements concerning the probability of osseous development in the ligaments of the pelvis which are mistaken for calculi. He emphasized what had been said of the atypical character of the clinical features in cases of stone.

Dr. Joseph Ransohoff, of Cincinnati, uses the X-ray only to confirm a diagnosis based upon a thorough clinical study. One symptom which he believes to be absolutely characteristic of stone in the kidney is persistent, continuous microscopic hæmaturia. An interesting point mentioned was that ureteral calculi sometimes produce no obstruction. Dr. Ransohoff has before shown a ureteral stone which was guttered, the groove allowing the urine to pass without difficulty. He has no difficulty

in controlling hemorrhage in nephrectomy with the fingers and dislikes the clamp because it prevents examination of the ureter. Whether or not the X-ray shows stone, he never regards an operation on the kidney complete without the passage of a catheter or probe along the whole length of the ureter.

Dr. Maurice H. Richardson, of Boston, has had encouraging results in his operations for stone in the kidney, yet differing in experience from Dr. Ransohoff, hemorrhage causes him anxiety in the approach to the pelvis of the kidney through the kidney tissue. He has seen calcification of mesentery tumors twice or three times which he thinks could easily cause a mistaken diagnosis. He has known of the continuance of pain after removal of stone from the kidney, and has seen stone in the kidney fatal 22 years after removal of stone from the bladder, with no sign of pain during those years.

Dr. Willy Meyer, of New York, believes that after exhausting laboratory research the X-ray should be employed in diagnosis of stone. Cystoscopy and catheterization should then be employed. The carmine test is of value unless obstruction is caused by the stone.

Dr. John C. Oliver, of Cincinnati, presented an oxalic acid stone which he had supposed was the largest one ever removed. That Dr. Barrow had removed a larger one was not surprising, however, for no matter what they did in Ohio, it was usual to find that they did a little better in Kentucky.

Dr. Lewis L. McArthur, of Chicago, referred to a case in which clinical and laboratory evidence pointed to stone in the kidney but in which the X-ray failed to give the shadow. Operation was thus delayed for six months until the patient was insistent, and at operation twenty stones were found in one kidney.

XV. STONE IN THE BLADDER, PNEUMATURIA, FECAL FISTULA.

Dr. Algernon T. Bristow, of Brooklyn, New York, read a paper with this title, for which see page 1013.

XVI. CARCINOMA OF THE FEMALE URETHRA.

Dr. Lewis S. McMurtry, of Louisville, Ky., read a paper with this title for abstract of which see page 1032.

Dr. Emmet Rixford, of San Francisco, reported an operation for stone in the bladder, in which autopsy revealed four ureters, in three of which were stones. In another case operated for subacute peritonitis a small kidney was found in the vicinity of the vermiform appendix. The right kidney was hypertrophied. Regarding the cure of double tuberculosis following removal of one kidney he suggests an explanation in the production of hyperæmia by the blood being forced into the kidney somewhat after the Bier method in the cure of tuberculosis of the extremities. If this is true it would seem not impossible to secure healing of small foci in tuberculous kidneys by other means than nephrectomy. Tuberculin may have a future in that direction.

Dr. A. G. Gerster, of New York, offered an explanation of the hemorrhage in nephrectomy occurring nine or ten days subsequent to operation, by the assumption of injury to a large arterial branch causing thrombosis, and that on the tenth day, the thrombosis becoming detached, the hemorrhage took place. In two cases he has been obliged to remove the kidney after simple exploratory incision in the pelvis because of uncontrollable hemorrhage. In one case it was shown that one of the large branches of the artery had been divided half way. He has since entirely abandoned the use of the knife in opening into the pelvis through the kidney and uses the following method: After incision of the cortical substance the knife is laid aside. With a curved director he pushes forward into the pelvis of the kidney. Along this he passes a dressing forceps into the pelvis. This instrument is opened and then withdrawn. The finger is inserted along the track which has thus been made by tearing and stretching.

Dr. Frederick Kammerer, of New York, reported three cases of unilateral infection of the kidney. In the first case recovery followed the removal of one kidney. In the second case, showing but two infarcts in one kidney and the other being normal, the incised kidney was tamponed and replaced. Barring a severe hemorrhage the patient did well at first, but the ascent of temperature indicated the necessity of extirpation of the kidney. The third case was one of perinephritic abscess in which removal of the kidney was finally necessary. The urine after nephrectomy was normal, as was the temperature, seeming to prove the point made in Dr. Brewer's paper that the infection can be unilateral.

Dr. John H. Gibbon, of Philadelphia, spoke of X-ray plates

as a most valuable means of diagnosticating ureteral calculi. Also important is the presence of microscopic blood. He pointed out the danger of the use of metal ureteral bougies. He referred to his previously published account of two cases of ureteral stone in which he did a combined extra- and intraperitoneal operation. The two great advantages of the method were the time saved and the less possible traumatism. While the ureters should be drained after removal of stone there is little difference whether or not they are sutured.

Dr. Charles L. Gibson reported a case with features similar to those described by Dr. Brewer with pain in the left kidney. Minute miliary deposits were seen at each pole. Half of the kidney at each pole was removed and the woman perfectly recovered.

Dr. George Woolsey, of New York, does not feel that a negative plate, even if considered perfect and taken by an expert is at all a sure sign of no ureteral stone. He has operated upon two cases in which he found the condition described by Dr. Brewer, and has obtained cure by nephrectomy.

XVII. SARCOMA OF THE COMMON BILE DUCT.

Dr. Francis J. Shepherd, of Montreal, read a paper with this title, for which see page 948.

XVIII. RHINOPLASTY FOR SUNKEN NOSE.

Dr. John F. Binnie, of Kansas City, Mo., reported a case in which the nasal bones and soft parts of the nose are intact; the cartilaginous septum absent; the end of the nose and the alæ are retracted into the pyriform opening. Subcutaneously the soft parts, inserted then into the edge of the pyriform opening and pulled the mobilized nose into position. With a tenotome he subcutaneously tunneled the soft parts of the mobilized nose and drew strips of cartilage through these tunnels in such a manner as to act as trusses for the support of the nose. The strips of cartilage were secured from the costal margins.

Dr. John B. Roberts, of Philadelphia, referred to a similar case under his care of a young girl in which he had taken two large tongue-shaped flaps from her fat cheeks.

Dr. Leonard Freeman, of Denver, spoke of two classes of saddle nose, one in which the skin is loose and one in which there

is considerable cicatricial tissue and tendency to contraction. Those of the former variety are satisfactorily treated by the use of paraffin, the latter by the employment of metal plates.

Dr. Emmet Rixford, of San Francisco, spoke of the availability of the tissue of the rib in these operations for sunken nose.

XIX. FINAL PSYCHICAL RESULTS OF MAJOR SURGICAL OPERATION.

Dr. James G. Mumford, of Boston, Mass., read a paper with this title, for which see page 853.

XX. IS HODGKIN'S DISEASE A TYPE OF SARCOMA?

Dr. William B. Coley, of New York, read a paper based upon a study of upward of 80 cases of sarcoma primary in the lymphatic glands. He stated that the small group of tumors designated as Hodgkin's disease or pseudoleukæmia, have certain definite clinical and histological characteristics sufficient to differentiate them from other tumors of the lymphatic glands, *e.g.*, tuberculosis and the ordinary types of sarcoma. However, a close study, clinical, microscopical and anatomical, furnishes strong evidence that the process dealt with is a neoplastic one, so similar to sarcoma as to be properly classified as a variety or type of the latter. The later history and autopsy record of a case published in detail in his former paper on Hodgkin's disease was given. This case is much like the one reported by Gibbons, of San Francisco (Am. Jour. of the Med. Sciences, Nov., 1906). Dr. Coley furthermore stated that Hodgkin's disease closely resembles neoplasms, especially sarcoma, in the way in which it is affected by the X-ray and the mixed toxins of erysipelas and Bacillus prodigiosus. He detailed a case of Hodgkin's disease, the clinical picture of which was quite characteristic, and in which the clinical diagnosis was confirmed by the microscope. The disease disappeared under six weeks' treatment with the mixed toxins and the patient is perfectly well at seven months later. There are no enlarged glands and spleen and liver are normal. He expressed the following conclusions:

The clinical features of Hodgkin's disease are often so nearly identical with those of round-cell sarcoma, that it is impossible to differentiate the two conditions.

The histological features so closely resemble sarcoma that

if a given specimen be examined by different pathologists, opinions would be about equally divided between Hodgkin's disease and sarcoma.

The onset of the disease, its course and duration, formation of general metastases, and final ending in death, most closely simulate sarcoma.

While in most cases the metastases occur in preëxisting lymph-gland tissue, this is by no means always true, since in some cases, *e.g.*, Dr. Gibbons' and his own, the tumor breaks through the capsule, infiltrates the surrounding tissues, fascia, mucle, periosteum and the bone itself.

The fact that Hodgkin's disease and leukæmia have certain features pointing to an infectious origin, should not exclude them from being classed as malignant tumors, but, on the contrary, this fact furnishes additional evidence in favor of the infectious origin of sarcoma.

In view of the utter hopelessness of Hodgkin's disease as well as leukæmia, from surgical and medical treatment, and in view of the remarkable results obtained, though in a very limited number of cases, with the X-rays and the mixed toxins of erysipelas and Bacillus prodigiosus, the best chance of success apparently lies in a wider application of these methods of treatment, either singly or in combination.

XXI. THE PSYCHIC FACTOR IN GRAVES' DISEASE.

Dr. George W. Crile, of Cleveland, O., read a paper with the above title, for which see page 864.

XXII and XXIII. CARCINOMA OF THE APPENDIX.

Dr. Richard H. Harte, of Philadelphia, and Dr. Robert G. Le Conte, of Philadelphia, presented papers with this title, for which see pages 968, and 1000.

XXIV. ŒDEMA OF LARGE INTESTINE WITH LOCALIZED NECROSIS OF ITS WALL, FOLLOWING SPLENECTOMY IN BANTI'S DISEASE.

Dr. John E. Summers, Jr., of Omaha, read a paper with this title, for which see page 1006.

XXV. WASHING OUT THE INTESTINE THROUGH MULTIPLE ENTEROTOMY OPENINGS.

DR. GEORGE H. MONKS, of Boston, Mass., read a paper with this title, for which see page 953.

XXVI. CONGENITAL IDIOPATHIC DILATATION OF THE COLON (HIRSCHPRUNG'S DISEASE).

DR. J. M. T. FINNEY, of Baltimore, after reporting the case of a young boy upon whom he had operated, reviewed the literature of the subject to January 1, 1908. Two hundred and six references had been studied. While to Hirschprung belongs the credit of having first called attention to the disease, a number of cases have been found in literature antedating his classical description. After discussing the various terms that have been applied to the disease and its classification and the anatomy of that portion of the intestine concerned, Dr. Finney discussed the various hypotheses as to its etiology. Some ten theories have been suggested from time to time as to the causation of the disease including that of the author of hypernutrition. These theories are all discussed and the arguments for and against given. No one apparently explains every case but each will explain some. The symptomatology was described and a complete clinical picture of the disease given, with a list of the series of cases observed in the Johns Hopkins Hospital, eleven in all. The diagnosis, differential diagnosis, the different aids to the diagnosis, prognosis and treatment were considered. While no one course of treatment seems applicable to all cases, the author suggests one method employed in his own case as perhaps applicable to a larger proportion than any other hitherto suggested, namely: A preliminary enterostomy, then a colocolostomy some months subsequently; finally the complete excision of the affected portion. The artificial anus is left open until after the success of the preceding steps has been assured, when it is closed under cocaine.

DR. LEONARD FREEMAN, of Denver, reported the case of a young man presenting a pronounced type of Hirschprung's disease. He had been troubled with constipation ever since he could remember and as much as three months had elapsed at one time without a movement of the bowels. The colon was enormously dilated below the splenic flexure. The surface of the large intes-

tine was plicated and replicated and replicated again until it was reduced to something like normal size. It was impossible to make anastomosis or to resect the bowel. Enlargement of the mesentery was not noticed. The subsequent history of the case was reasonably good. Dr. Freeman would not ordinarily consider this operation of plication a good one for the ordinary case, but in the present case it answered the purpose.

XXVII. RECTAL DRAINAGE FOR PELVIC ABSCESS.

Dr. Archibald MacLaren, of St. Paul, Minn., read a paper with the above title, for abstract of which see page 1034.

XXVIII. HÆMOLYTIC TESTS FOR CANCER.

Dr. George W. Crile, of Cleveland, Ohio, presented a report on the value of hæmolytic tests in the diagnosis of cancer. For purpose of control, 107 individuals in good health were subjected to hæmolytic tests, in none of which was any hæmolysis elicited. Fifty individuals, the subjects of miscellaneous diseases, were experimented upon; in four instances hæmolysis was elicited. These four included one case of hæmoglobinuria, one of eclampsia, one of hæmaturia and one gastric case,—diagnosis not made. Fifty cases of carcinoma were tested, of whom 39 presented hæmolysis; 16 cases of sarcoma, of whom 13 hæmolyzed; making a total of 66 cases of malignancy, of which 53 hæmolyzed.

Of cases of carcinoma recurrence, or cures, to prove if cured, ten tests were made, of whom nine gave no hæmolysis; one, questionable. Two cases of papilloma, one hæmolyzed; one, no hæmolysis. Eleven cases of surgical tuberculosis, nine gave hæmolysis. Ten cases of chronic suppuration, none hæmolyzed.

Of the 13 cases of malignant disease which did not give hæmolytic reaction, one was a gastric case, diagnosis not proven; one an advanced case of sarcoma of the spine; one an advanced case of presumed sarcoma; one advanced case of recurrent carcinoma; five were advanced cases of carcinoma of the breast; two were advanced cases of epithelioma of the neck; one an advanced case of lymphosarcoma; and one a case of cystic ovary.

In 14 cases of suspected malignancy that were subjected to

the test, in one hæmolysis was elicited. In all these latter, positive diagnosis of nonmalignant disease was arrived at; of these, two were gastric cases; four gall-bladder cases; two, tumors of the thigh; one, breast case (cyst); one, tumor of the chin; one, tumor of the clavicle; one, cystic ovary; two, cirrhosis of the liver.

As an example of the value of the method, specific mention was made of a case seen in the medical service of the hospital, March 18, 1908, which showed hæmolysis and reverse hæmolysis, in consequence of which a tentative diagnosis of carcinoma of the stomach was made; a diagnosis of anæmia having previously been made by the physician in charge. One month later, after palpation, a specimen of tissue from the stomach contents was obtained, from which an absolute diagnosis of carcinoma of the stomach was made.

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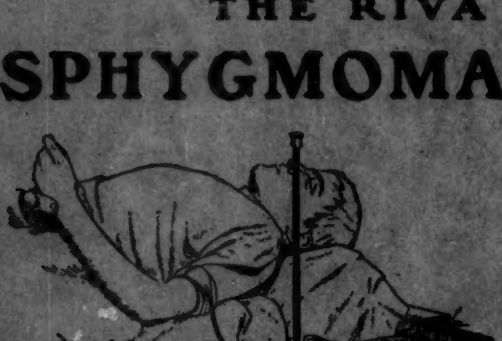

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The physician cannot be too careful in the selection of the kind of codeia he administers. The manufacturers of antikamnia and codeine tablets guarantee the purity of every grain of codeia which enters into their tablets. This not only prevents habit and the consequent irritation which follows the use of impure codeia, but it does away with constipation or any other untoward effect.

A CALIFORNIA NIGHT

A crescent moon in a purple sky;
No sound, from crag to rill,
Save the whispering night-winds in the palm,
And the fountain's sluggish spill.

—*June Lippincott's.*

GREATEST LUMBER CUT

More lumber was cut in the United States last year than in any other year in its history. The enormous amount of 37,550,736 board feet was produced, and the mill value of this was $621,151,388. In addition, there were produced 11,858,260,000 shingles, valued at $24,155,555, and 3, 812,807,000 lath, valued at $11,490,570. On the whole, it is safe to say that the present annual lumber cut of the United States approximates 40 billion feet, and that the total mill value of the lumber, lath, and shingles each year produced is not less than $700,000,000. These figures give some idea of how vast is the lumber industry and how great is the demand for its products.

A glance at the kinds of lumber produced shows very clearly the passing of white pine and oak, one of the greatest softwood and the other the greatest hardwood which the forest has ever grown. Since 1899 the cut of white pine has fallen off more than 40 per cent., while that of white oak has fallen off more than 36 per cent. To-day yellow pine leads all other woods in amount cut, while Douglas fir—and this will be a surprise to many—comes second. Since 1899 the cut of Douglas fir has increased 186 per cent. Louisiana is the foremost yellow pine State, with Texas, Mississippi, and Arkansas following in order. Washington produces by far the greatest amount of Douglas fir.

A comparison of the lumber-producing States shows that since 1899 there have been many changes in their relative rank. Washington, which in 1899 stood sixth, now leads, while Wisconsin, which eight years ago led all others, is now third. In the same period Oregon, Louisiana, Mississippi, Idaho, and California made great strides as lumber-producing States, though, on the other hand, the amount produced in Michigan, Wisconsin, Minnesota, Georgia, Kentucky, Tennessee, Missouri, Indiana, and Ohio fell off anywhere from 29 to 54 per cent.

The highest-priced native woods are walnut, hickory, and ash, and the cheapest are larch and white fir. From the fact, however, that since 1899 the average increase in the price of lumber has been 49 per cent., it will not be long before cheap woods are few and far between.

Figures upon the lumber cut of the United States in 1906 are contained in Circular 122 of the Forest Service, which can be had upon application to the Forester, U. S. Department of Agriculture, Washington, D. C.

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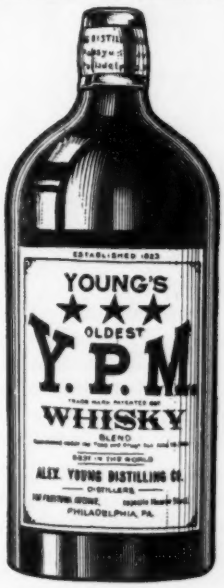

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FEEDING OF TYPHOID PATIENTS

There are two points of clinical importance which should influence the physician in the selection of a proper diet for typhoid fever. They are, first, the supposed danger of mechanically irritating the ulcerated surface in the intestine and the danger in overloading the gastro-intestinal tract whose digestive functions are impaired by the fever.

Second, the relations of the chemical ingredients of the food to the increased tissue change that causes, or accompanies, the excessive production of heat. If the proper fluid can be furnished as a food, the tissues are spared too great self-consumption in producing heat. In regard to the first fact, the danger of mechanical irritation of the intestinal wall is somewhat exaggerated. In prescribing a sole milk diet for typhoid fever in order to lessen this danger, many overlook the fact that milk, alone, on entering the stomach becomes almost solid, and large, firm curds are likely to prove quite as irritating to the ulcerating surfaces, or even more so, than starchy food. When patients are fond of milk and seem to digest and absorb it thoroughly, there is no better diet when employed with Bovinine. It answers every requirement of a perfect fever food. It contains all the essential elements of nutrition, is readily digested, furnishes fluid to the tissues, is a good diarrhetic, and if properly administered it is soothing to the stomach when gastric catarrh exists. Those who dislike milk or do not seem to digest it, do well on Bovinine in barley, rice, or plain, and later, when the digestive condition has improved, milk may again be taken up.

A COLD LUNCH

The pupils of a distinguished professor of zoölogy, a man well known for his eccentricities, noted one day two tidy parcels lying on their instructor's desk as they passed out at the noon hour. On their return to the laboratory for the afternoon lecture, they saw but one. This the professor took carefully up in his hand as he opened his lecture.

"In the study of vetebrata we have taken the frog as a type. Let us now examine the gastrocnemius muscle of this dissected specimen."

So saying, the professor untied the string of his neat parcel and disclosed to view a ham sandwich and a boiled egg.

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—*June Lippincott's.*

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MUSINGS

Maybe it is called a train of thought because it is so apt to get off the track.

Perhaps there is at least as much enjoyment to be had in air-castles as in any other kind.

Deeds, of course, are mightier than words; yet some people manage to talk their way through life, and get along pretty well at that.

Duty will have to cultivate a more agreeable voice before it will be able to command universal attention.

It is generally unwise to call a man a fool. Even if he agrees with you, he may think he is not such a fool as to need the information.

Misery likes company even better when it does n't like the company.

Some things that may be had for the asking are dear at the price.

Some people grumble every time they compare themselves with other people, and so do the other people.

—*June Lippincott's.*

HALF OF THE PLEASURE

The youngest girl of a Baltimore family was recently much distressed, at dessert, to discover that there was ice-cream for dinner.

"Oh, papa!" exclaimed the youngster reproachfully, "why didn't they tell me this morning that we were going to have ice-cream?"

"What difference would that have made?"

"Lots!" sighed the child. "I could have expected it all day!" —*June Lippincott's.*

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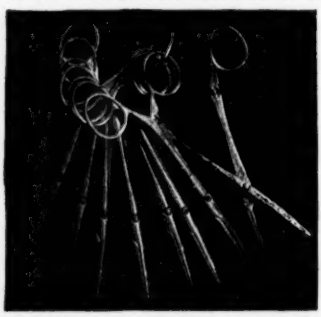

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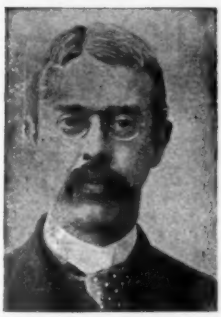

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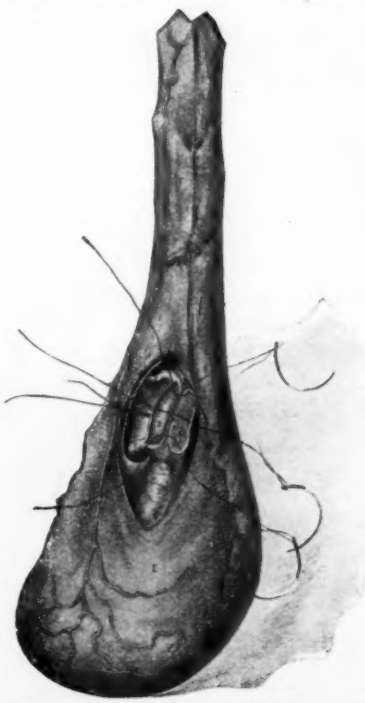

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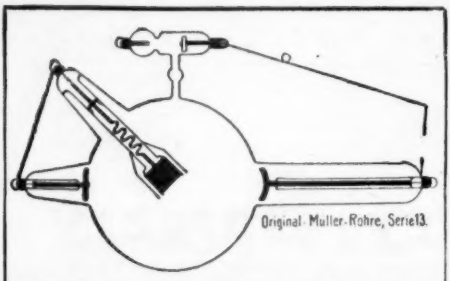

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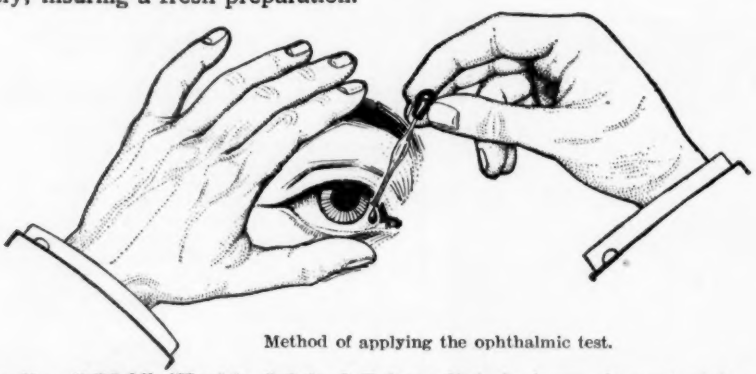

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